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Information technology - Automation/Drive Interface - Commands (ADC)

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American National Standards for Information Systems -

Automation/Drive Interface - Commands

Secretariat
InterNational Committee for Information Technology Standards

Approved mm dd yy

American National Standards Institute, Inc.

Abstract

This standard specifies the device model and functional requirements for the SCSI automation drive interface device type. This standards permits the SCSI automation drive interface device type to attach to application clients and provides the definitions for their use.

This standard does not contain material related to any service delivery subsystem that is used to transport the commands, command parameter data, command response data, and status specified in this standard. For reference to delivery subsystems and transports, refer to the Automation Drive Interface - Transport Protocol standard.

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Foreword

This foreword is not part of American National Standard NCITS.***:200x.

This standard specifies the external behavior of a device server that defines itself as an automation drive interface device in the DEVICE TYPE field of the INQUIRY command response data. This device type is known as an automation drive interface device. This standard conforms to the SCSI Architecture Model - 2 standard.

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Requests for interpretation, suggestions for improvement and addenda, or defect reports are welcome. They should be sent to the INCITS Secretariat, InterNational Committee for Information Technology Standards, Information Technology Institute, 1250 Eye Street, NW, Suite 200, Washington, DC 20005-3922.

This standard was processed and approved for submittal to ANSI by the InterNational Committee for Information Technology Standards (INCITS). Committee approval of the standard does not necessarily imply that all committee members voted for approval. At the time it approved this standard, INCITS had the following members:

(Editor’s Note: Insert INCITS member list)

Technical Committee T10 on SCSI Storage Interfaces, which developed and reviewed this standard, had the following members: (Editor’s Note: Update for current membership)

Introduction

This standard is divided into the following clauses:

Clause 1 is the scope.
Clause 2 enumerates the normative references that apply to this standard.
Clause 3 describes the definitions, symbols, and abbreviations used in this standard.
Clause 4 describes an overview and model of the automation drive interface device.
Clause 5 describes the command set for automation drive interface devices.
Clause 6 describes the parameters for automation drive interface devices.

American National Standard **INCITS.***:200x**

American National Standard for Information Systems - Information Technology - Automation/Drive Interface - Commands (ADC)

1 Scope

This standard defines the model and command set extensions to facilitate operation of automation drive interface devices. The clauses of this standard, implemented in conjunction with the applicable clauses of SPC-2 and SPC-3, fully specify the standard command set for automation drive interface devices.

The objective of this standard is to provide the following:

a) Permit an application client to communicate over a SCSI service delivery subsystem, with a logical unit that declares itself to be an automation drive interface device in the device type field of the INQUIRY command response data (see SPC-3);
b) define commands unique to the automation drive interface device type; and
c) define commands and parameters to manage the operation of the automation drive interface device type.

Figure 1 shows the relationship of this standard to the other standards and related projects in the SCSI family standards as of the publication of this standard.

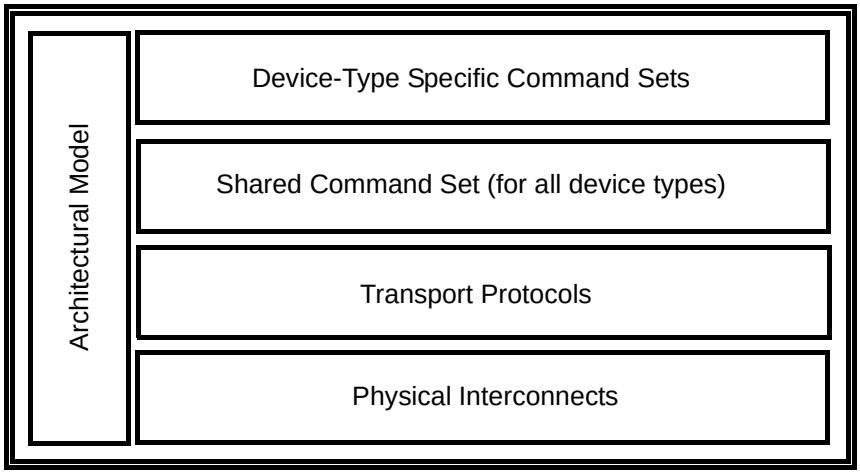

Figure 1 — General Document Structure of SCSI

Figure 1 is intended to show the general relationship of the documents to one another. Figure 1 is not intended to imply a relationship such as a hierarchy, protocol stack, or system architecture. It indicates the applicability of a standard to the implementation of a given transport.

2 Normative References

2.1 Normative references

The following standards contain provisions that, by reference in the text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

Copies of the following documents may be obtained from ANSI: approved ANSI standards, approved and draft international and regional standards (ISO, IEC, CEN/CENELEC, ITUT), and approved and draft foreign standards (including BSI, JIS, and DIN). For further information, contact ANSI Customer Service Department at 212-642-4900 (phone), 212-302-1286 (fax) or via the World Wide Web at http://www.ansi.org.

Additional availability contact information is provided below as needed.

2.2 Approved references

ISO/IEC 14776-412, *SCSI Architecture Model - 2 standard*
ISO/IEC 14776-452, *SCSI Primary Commands - 2 standard*
ISO/IEC 14776-331, *SCSI-3 Stream Commands standard*
ISO/IEC 14776-351, *SCSI-3 Medium Changer Commands standard*
ISO/IEC 14165-251, *Fibre Channel Framing and Signaling Interface*
ISO/IEC 14165-122, *Fibre Channel Arbitrated Loop - 2*
ISO/IEC 14776-222, *SCSI Fibre Channel Protocol - 2 standard*

2.3 References under development

At the time of publication, the following referenced standards were still under development. For information on the current status of the document, or regarding availability, contact the relevant standards body or other organization as indicated.

ISO/IEC 14776-453, *SCSI Primary Commands - 3 standard*
ISO/IEC 14776-413, *SCSI Architecture Model - 3 standard*
ISO/IEC 14776-332, *SCSI Stream Commands - 2 standard*
ISO/IEC 14776-333, *SCSI Stream Commands - 3 standard*
ISO/IEC 14776-115, *SCSI Parallel Interface - 5*
ISO/IEC 14776-352, *SCSI Media Changer Commands - 2 standard*

3 Definitions, symbols, abbreviations, and conventions

3.1 Definitions

3.1.1 accessible state: The state of a device server in which it is capable of responding to a command with any combination of status and sense key other than CHECK CONDITION and NOT READY.

3.1.2 ADT initiator port: A SCSI initiator port that implements ADT.

3.1.3 ADT port: An ADT initiator port, ADT target port, or ADT target/initiator port.

3.1.4 ADT target port: A SCSI target port that implements ADT.

3.1.5 ADT target/initiator port: A port that has all the characteristics of an ADT target port and an ADT initiator port.

3.1.6 application client: An object that is the source of SCSI commands (see SAM-2).

3.1.7 automation application client: In an automation device, the entity that performs invocation of commands or requests on the ADC device server in the DT device (see 4.2.1).

3.1.8 automation device: A device containing one or more SMC device servers (see SMC-2) or equivalent, one or more automation application clients, and one or more ports to access a DT device (e.g., an ADT port). An automation device may contain one or more automation device primary ports (see 4.2.1).

3.1.9 automation device primary port: A A SCSI target port in an automation device.

3.1.10 bridging: A DT device facilitating invocation of commands or requests on the remote SMC device server (see 4.2.3).

3.1.11 bridging manager: In a DT device implementing bridging, the entity that performs invocation of commands or requests on the remote SMC device server (see 4.2.3).

3.1.12 byte: Indicates an 8-bit construct.

3.1.13 contingent allegiance: An optional condition of a task set following the return of a CHECK CONDITION status (see SAM-2).

3.1.14 data transfer device: A device containing an RMC device server, an ADC device server, one or more ports to access an automation device (e.g., an ADT port), and one or more DT device primary ports (see 4.2.1). A data transfer device may contain a bridging manager and local SMC device server (see 4.2.3).

3.1.15 data transfer device primary port: A SCSI target port in a data transfer device.

3.1.16 device server: An object within the logical unit that processes SCSI tasks according to the rules for task management (see SAM-2).

3.1.17 field: A group of one or more contiguous bits.

3.1.18 I_T nexus: A nexus that exists between a SCSI initiator port and a SCSI target port (see SAM-2).

3.1.19 I_T_L nexus: A nexus that exists between a SCSI initiator port, a SCSI target port, and a logical unit (see

SAM-2). This relationship extends the prior I_T nexus.

3.1.20 I_T_L_Q nexus: A nexus between a SCSI initiator port, a SCSI target port, a logical unit, and a task tag following the successful receipt of a task tag (see SAM-2). This relationship extends the prior I_T nexus or I_T_L nexus.

3.1.21 local SMC device server: The SMC device server in a DT device implementing bridging (see 4.2.3).

3.1.22 logical unit: A SCSI target device object, containing a device server and task manager, that implements a device model and manages tasks to process SCSI commands sent by an application client (see SAM-2).

3.1.23 logical unit number: An identifier for a logical unit.

3.1.24 logical unit reset: A logical unit action in response to a logical unit reset event in which the logical unit performs the operations described in SAM-2.

3.1.25 logical unit reset event: An event that triggers a logical unit reset from a logical unit (see SAM-2).

3.1.26 medium: The operational substrate and its carrier that is removable from a DT device.

3.1.27 mounted: The state of a medium in a DT device when the DT device is physically capable of processing operations that involve interactions between the read/write element(s) of the DT device and the operational substrate of the medium. A medium in a DT device is not mounted when the medium seating, threading, positioning to its usable area, unthreading, or unseating.

3.1.28 nexus: A relationship between a SCSI initiator port and a SCSI target port that may extend to a logical unit and a queue tag.

3.1.29 not accessible state: The state of a device server in which it is capable of responding to a command with a status of CHECK CONDITION and sense key of NOT READY.

3.1.30 object: An architectural abstraction that encapsulates data types, services, or other objects that are related in some way.

3.1.31 ready state: A state where a logical unit is able to accept an appropriate medium-access command without returning CHECK CONDITION status.

3.1.32 remote SMC device server: The SMC device server in an automation device that receives SCSI commands and task management requests via a DT device implementing bridging (see 4.2.3).

3.1.33 removable medium commands (RMC): A generic term for a command set supporting removable media (e.g., SSC-2 or MMC-4).

3.1.34 SCSI initiator device: A SCSI device containing application clients and SCSI initiator ports that originate device service and task management requests to be processed by a SCSI target device (see SAM-2).

3.1.35 SCSI initiator port: A SCSI initiator device object acts as the connection between application clients and the service delivery subsystem through which requests and responses are routed (see SAM-2).

3.1.36 SCSI target device: A SCSI device containing logical units and SCSI target ports that receives device service and task management requests for processing (see SAM-2).

3.1.37 SCSI target port: A SCSI target device object that contains a task router and acts as the connection between device servers and task managers and the service delivery subsystem through which requests and

responses are routed (see SAM-2).

3.1.38 sense masking timeout value (SM_TOV): A period of time for which a DT device masks sense data (see 4.2.5).

3.1.39 task: An object within the logical unit representing the work associated with a command or group of linked commands (see SAM-2). A task consists of one initial connection and zero or more physical or logical reconnections, all pertaining to the task.

3.1.40 task management request: A request that a task management function be performed (see SAM-2).

3.1.41 task set: A group of tasks within a device server, whose interaction is dependent on the task management, contingent allegiance and auto-contingent allegiance rules (see SAM-2).

3.1.42 vendor-specific: Something (e.g., a bit, field, code value) that is not defined by this standard and may be used differently in various implementations.

3.1.43 zero: A false signal value or a false condition of a variable.

3.2 Symbols and abbreviations

= or EQ	equal
ADC	Automation/Drive Interface - Commands
ADI	Automation/Drive Interface
ADT	Automation/Drive Interface - Transport Protocol
DT	Data transfer (e.g., DT device)
FC-AL-2	Fibre Channel Arbitrated Loop (see clause 2)
FC-FS	Fibre Channel Framing and Signaling (see clause 2)
FCP-2	Fibre Channel Protocol-2
Gb/sec	Gigabits per second
LSB	Least significant bit
LUN	Logical unit number
MAM	Medium Auxiliary Memory
MSB	Most significant bit
RMC	Removable Medium Commands
Rsvd	Reserved
SAM-2	SCSI Architecture Model-2
SAM-3	SCSI Architecture Model-3
SCSI	Small Computer System Interface
SM_TOV	Sense masking timeout value
SMC	SCSI Media Changer Commands
SPC-2	SCSI Primary Commands-2
SPC-3	SCSI Primary Commands-3
SPI-5	SCSI Parallel Interface-5 (see clause 2)
SSC	SCSI Stream Commands
SSC-2	SCSI Stream Commands-2
SSC-3	SCSI Stream Commands-3
VPD	Vital Product Data (see SPC-3)

3.3 Keywords

3.3.1 expected: A keyword used to describe the behavior of the hardware or software in the design models assumed by this standard. Other hardware and software design models may also be implemented.

3.3.2 invalid: A keyword used to describe an illegal or unsupported bit, byte, word, field or code value. Receipt of an invalid bit, byte, word, field or code value shall be reported as an error.

3.3.3 mandatory: A keyword indicating an item that is required to be implemented as defined in this standard to claim compliance with this standard.

3.3.4 may: A keyword that indicates flexibility of choice with no implied preference.

3.3.5 may not: Keywords that indicate flexibility of choice with no implied preference.

3.3.6 obsolete: A keyword indicating that an item was defined in prior SCSI standards but has been removed from this standard.

3.3.7 optional: A keyword that describes features that are not required to be implemented by this standard. However, if any optional feature defined by this standards is implemented, it shall be implemented as defined in this standard.

3.3.8 reserved: A keyword referring to bits, bytes, words, fields and code values that are set aside for future standardization. Their use and interpretation may be specified by future extensions to this or other standards. A reserved bit, byte, word or field shall be set to zero, or in accordance with a future extension to this standard. Recipients are not required to check reserved bits, bytes, words or fields for zero values. Receipt of reserved code values in defined fields shall be reported as an error.

3.3.9 shall: A keyword indicating a mandatory requirement. Designers are required to implement all such requirements to ensure interpretability with other products that conform to this standard.

3.3.10 should: A keyword indicating flexibility of choice with a preferred alternative; equivalent to the phrase "it is recommended".

3.4 Conventions

Certain words and terms used in this American National Standard have a specific meaning beyond the normal English meaning. These words and terms are defined either in clause 3 or in the text where they first appear. Names of signals, phases, messages, commands, statuses, sense keys, additional sense codes, and additional sense code qualifiers are in all uppercase (e.g., REQUEST SENSE), names of fields are in small uppercase (e.g., STATE OF SPARE), lower case is used for words having the normal English meaning.

Fields containing only one bit are usually referred to as the name bit instead of the name field.

Numbers that are not immediately followed by lower-case b or h are decimal values.

Numbers immediately followed by lower-case b (xxb) are binary values.

Numbers immediately followed by lower-case h (xxh) are hexadecimal values.

Decimals are indicated with a comma (e.g., two and one half is represented as 2,5).

Decimal numbers having a value exceeding 999 are represented with a space (e.g., 24 255). An alphanumeric list (e.g., a,b,c or A,B,C) of items indicate the items in the list are unordered.

A numeric list (e.g., 1,2,3) of items indicate the items in the list are ordered (i.e., item 1 must occur or complete before item 2).

In the event of conflicting information the precedence for requirements defined in this standard is:

1) text,
2) tables, then
3) figures.

4 General

4.1 Overview

This standard defines a command set that allows interactions between an automation device (e.g., a media changer) and a data transfer device (e.g., a removable medium device). Interactions initiated by either the automation device and the data transfer device are defined.

Commands in this standard do not require the use of a specific SCSI transport protocol.

4.2 Automation drive interface model

4.2.1 Automation drive interface overview

An Automation/Drive Interface - Commands (ADC) device server provides the means for an automation device to monitor and control a data transfer (DT) device.

An automation device contains:

a) An SMC device server, which controls a mechanism to move storage media among DT devices and storage elements;
b) Zero or more automation device primary ports, through which the SMC device server may receive commands or task management requests;
c) An automation application client (see 3.1.7); and
d) An ADT port (see 3.1.3), through which the automation application client invokes commands or task mangement requests on the ADC device server in the DT device.

A DT device contains:

a) An ADC device server;
b) An RMC device server (e.g., an SSC device server), which processes tasks from application clients performing write and read operations;
c) An optional SMC device server and bridging manager (see 4.2.3);
d) One or more DT device primary ports (e.g., SPI-5 or Fibre Channel), through which the device servers contained within the DT device may receive commands or task management requests; and
e) An ADT port, through which the device servers contained within the DT device may receive commands or task management requests.

The automation application client may perform one or more of the following operations:

a) Configure the DT device's operational parameters (e.g., SCSI Port ID, Fibre Channel target device name, and Autoload mode);
b) Enable or disable the DT device's primary ports (e.g., Parallel SCSI or Fibre Channel);
c) Determine the DT device's status, including the position of the removable medium and whether a medium access command is in process; or
d) Cause the DT device to unload or load a medium, even if its RMC device server is reserved by an application client (see 4.2.2).

These operations are performed by invoking various SCSI commands and processing task management requests on the ADC device server. The application client within the automation device that invokes these requests is called

the automation application client. Communication between device servers within the automation device and the automation application client are outside the scope of this standard.

Figure 2 shows an example hardware view of the relationship between an automation device and DT devices using ADT transport protocol interfaces.

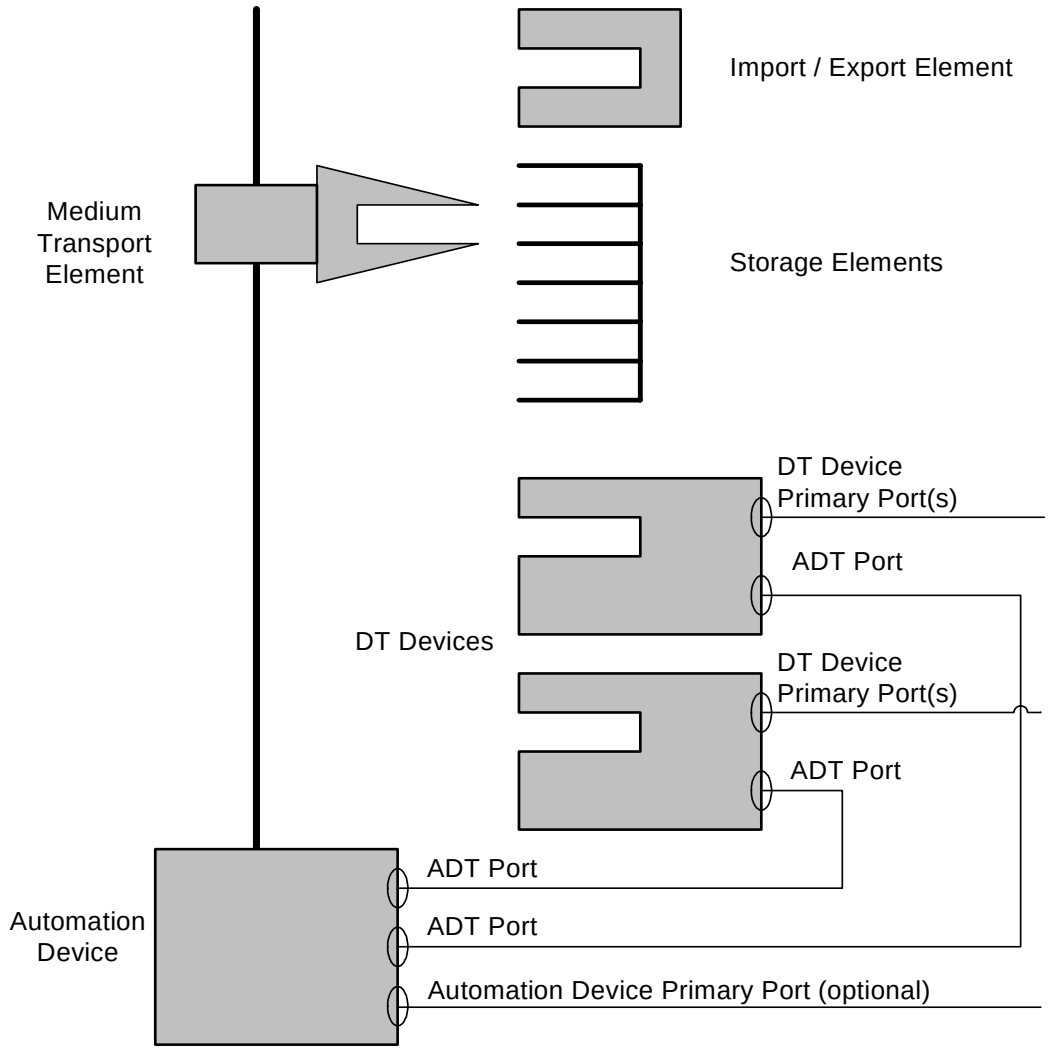

Figure 2 — Automation device and DT device relationship

4.2.2 Device server interaction

Figure 3 shows an automation device with an automation application client and a remote SMC device server, and a DT device with an RMC device server, an ADC device server, and an optional local SMC device server (see 4.2.3). Because the RMC and ADC device servers coexist within a single target device and serve the same physical device, they interact with each other in various ways.

If enabled (see 6.2.2.4.2), the RMC device server shall be accessible as a logical unit through the DT device primary port. The ADC device server may be accessible as a logical unit through the DT device primary port. The

ADC device server shall be accessible as a logical unit through the ADT port. The RMC device server should be accessible as a logical unit through the ADT port, and may be an asymmetric logical unit (see SAM-3).

PREVENT ALLOW MEDIUM REMOVAL commands (see SPC-3) issued to the RMC device server shall not affect the ADC device server.

Sense data reported by the RMC device server may be masked (see 4.2.5) for a period of time while the automation device is in the process of loading a medium. The NOTIFY DATA TRANSFER DEVICE command (see 5.2) provides a mechanism for the application client to indicate that the load attempt has ended in a failure, such that the RMC device server that was masking sense data changes shall resume reporting sense data for the failure.

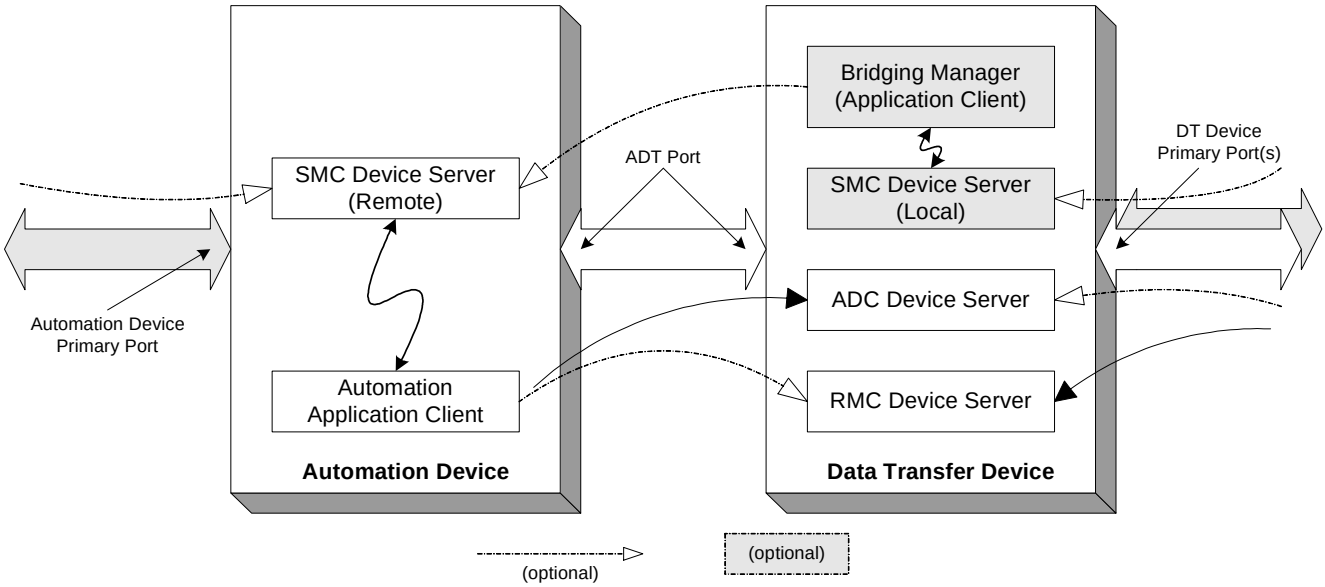

Figure 3 — Device server model

Since the RMC and ADC device servers share the same physical device, operations related to the physical device are cause for interaction between the RMC and ADC device servers. Unit attention conditions shall be established by both the RMC and ADC device servers for causes based on the shared physical device (e.g., pressing an eject button on the physical device). Unit attention conditions shall not be propagated across both the RMC and ADC device servers for causes that are strictly within the domain of one device server.

The ADC device server shall not support reservations. The ADC device server avoids reservation conflicts with other device servers since reservations held against one device server do not affect other device servers. This approach allows the automation application client to interact with the physical device via the ADC device server without a conflict due to reservations on other device servers.

The ADC device server supports mode pages that may affect the RMC device server (see 6.2.2.4.2). The ADC mode pages may override some mode parameters of the RMC device server (e.g., load or unload behavior).

Some commands supported by the ADC device server are dependent upon the readiness of the removable medium (see table 5). A TEST UNIT READY command (see SPC-2) issued to the ADC device server indicates the readiness of the removable medium. The ADC device server shall establish a unit attention condition with an additional sense code of NOT READY TO READY TRANSITION based on the readiness of the removable medium.

A LOAD UNLOAD command (see SSC-2) processed by the ADC device server may affect the ready state of the RMC device server. This shall cause the RMC device server to establish appropriate unit attention conditions. A LOAD UNLOAD command processed by the RMC device server may affect the ready state of the ADC device server. This shall cause the ADC device server to establish appropriate unit attention conditions. The interaction between the ADC task set and other task sets within the DT device are vendor-specific.

The RMC and ADC device servers maintain independent TapeAlert flags (see 4.2.6) and return them to application clients. Retrieving the TapeAlert flag information from the ADC device server has no impact on the TapeAlert flags reported by the RMC device server. Retrieving the TapeAlert flag information from the RMC device server has no impact on the TapeAlert flags reported by the ADC device server.

Communication between the application clients and device servers within a DT device, and application clients and device servers and the DT device itself are outside the scope of this standard.

4.2.3 ADI bridging

4.2.3.1 ADI bridging introduction

The DT device may support ADI bridging for the automation device. When ADI bridging is enabled via the ENABLE bit of the SMC Logical Unit descriptor (see 6.2.2.4.3), the DT device shall contain the bridging manager and the local SMC device server (see figure 3). The DT device shall report to its DT device primary port(s) a logical unit that implements an SMC device server (i.e., the local SMC device server), and the automation device shall report a logical unit to the automation device ADT port that implements an SMC device server (i.e., the remote SMC device server). The local SMC device server may be accessible as a logical unit through the DT device ADT port, and may be an asymmetric logical unit (see SAM-3).

The local SMC device server receives a SCSI command or task management request via a DT device primary port. In processing the command or request, the local SMC device server may require the automation device to perform tasks. To do this, the local SMC device server passes requests to an application client in the DT device (i.e., the bridging manager). This communication is performed by means outside the scope of this standard. Using the ADT ports on the DT device and automation device, the bridging manager then invokes requests on the remote SMC device server that resides in the automation device.

The effect is that some or all requests addressed to the local SMC device server are passed to the remote SMC device server through the ADT port. This may be used in low-cost automation devices that do not have automation device primary ports.

4.2.3.2 Local SMC device server operation

The local SMC device server shall support commands as required by the SCSI Medium Changer device type. Because the transport protocol connecting the bridging manager and the remote SMC device server may not carry information about which initiator port originated a request, the remote SMC device server is not able to implement the complete set of commands. Thus, the local SMC device server shall service commands and task management functions that require knowledge of the originating initiator port.

If any of the following commands are supported, they shall be processed by the local SMC device server and not passed through to the remote SMC device server:

a) RESERVE(6) and RESERVE(10) (see SPC-2);
b) RELEASE(6) and RELEASE(10) (see SPC-2);
c) PERSISTENT RESERVE IN (see SPC-3);
d) PERSISTENT RESERVE OUT (see SPC-3);
e) REPORT LUNS (see SPC-3); or
f) REQUEST SENSE (see SPC-3).

The local SMC device server shall not support element reservations in the RESERVE(6), RELEASE(6), RESERVE(10), and RELEASE(10) commands. The local SMC device server shall not support the ELEMENT_SCOPE in the PERSISTENT RESERVE IN and PERSISTENT RESERVE OUT commands.

The local SMC device server shall also perform the following actions:

a) Check for reservation conflicts on all commands. Return RESERVATION CONFLICT on all commands that violate reservation rules (see SPC-2);
b) Manage unit attention conditions generated for multiple initiator ports. If the local SMC device server detects that a unit attention condition is pending for an initiator port when a new command is received, the local SMC device server shall return CHECK CONDITION for the command; and
c) When a DT device primary port uses contingent allegiance (see SAM-2), save sense data on a per initiator port basis.

The local SMC device server may augment information returned by the remote SMC device server based on information known only by the local SMC device server (e.g., Device Identification VPD page identification descriptors with an association value of 1h and supported operation codes).

4.2.3.3 Remote SMC device server operation

The remote SMC device server shall not support any protocol-specific mode pages or protocol-specific log pages.

The remote SMC device server shall not report Device Identification VPD page identification descriptors with an association value of 1h.

The remote SMC device server shall report unit attention conditions for all initiator ports to the ADC device server using the NOTIFY DATA TRANSFER DEVICE command (see).

4.2.3.4 Bridging manager operation

ADI bridging is enabled and disabled via the SMC Logical Unit descriptor of the ADC Device Server Configuration mode page implemented by the ADC device server (see 6.2.2.4.3). The descriptor specifies the logical unit number of the corresponding local SMC device server. When bridging is disabled, the logical unit shall not be reported to a REPORT LUNS command (see SPC-3) and the local SMC device server shall not respond to commands through the DT device primary port.

If the bridging manager receives a response from the remote SMC device server with a status of CHECK CONDITION and sense key of UNIT ATTENTION, the bridging manager shall discard the response and reissue the command. All other responses with a status of CHECK CONDITION, including those with a sense key of NOT READY, shall be returned to the local SMC device server for subsequent return via the DT device primary port. This shall have no effect on the cached NOT READY sense keys (see 4.2.3.5).

The bridging manager shall operate in a single threaded fashion (i.e., not issue more than one request at a time to the remote SMC device server). Queued requests received via the DT device primary port shall be queued in the local SMC device server and issued to the bridging manager one at a time. Moreover, if processing a single request by the local SMC device server requires issuing multiple requests to the remote SMC device server, then those requests shall be issued one at a time to the bridging manager.

4.2.3.5 Caching SMC data and status

The local SMC device server may preserve some data or status received from the remote SMC device server in a cache, in order to respond to certain commands without need for the bridging manager to invoke a command on the remote SMC device server (e.g., the local SMC device server may save the standard INQUIRY data from the remote SMC device server and return the data to any initiator port that requests it).

Caching of SMC ready state, standard INQUIRY data, VPD, and mode data is controlled by the CACHE bit in the SMC Logical Unit descriptor (see 6.2.2.4.3). When the CACHE bit is set to one, caching is enabled. If caching is enabled, the automation application client shall send the NOTIFY DATA TRANSFER DEVICE command (see) to the ADC device server when events occur that may change data cached by the local SMC device server. When the local SMC device server detects a possible change in the cached data, the local SMC device server shall discontinue using the cached data until the cached data has been updated. The local SMC device server shall issue any commands required to update the cache to the bridging manager before issuing any commands that the local SMC device server may have received from a DT device primary port and queued.

If caching is disabled, then the ADC device server shall ignore the bridging status byte (see) in the NOTIFY DATA TRANSFER DEVICE command. Thus the automation application client is not required to send a NOTIFY DATA TRANSFER DEVICE command for purposes of indicating changes in cached data. The automation application client may send the command to notify the DT device of events not related to changes in cached data.

Ready state indicates whether the remote SMC device server is accessible. The remote SMC device server is not accessible if it would respond to a command with a status of CHECK CONDITION and report a sense key of NOT READY. Otherwise, it is accessible. The local SMC device server may monitor the ready state of the remote SMC device server via the cache. If the ready state indicates not accessible, the local SMC device server shall report a status of CHECK CONDITION to commands requiring that the remote SMC device server be accessible, including TEST UNIT READY. The local SMC device server shall set the Sense Key to NOT READY and the additional sense code to that contained in the cache.

4.2.4 Load and unload states

4.2.4.1 Load states

Table 1 defines the states that may be reported in the very high frequency data log parameter in the DT Device Status log page during load operations (see 6.1.2.2). This information allows automation devices to coordinate loading and unloading of a medium with the DT device, and to obtain DT device activity status.

Table 1 — Load states

Load state	Very high frequency data log parameter field					
	INXTN	RAA	MPRSNT	MSTD	MTHRD	MOUNTED
a) DT device initialized, no medium present	0	1	0	0	0	0
b) Early detection of medium placement by DT device	0	1	1	0	0	0
c) Acknowledgement of medium control by DT device	0	0	1	0	0	0
d) Medium seating	1	0	1	0	0	0
e) Medium seated	0	0	1	1	0	0
f) Medium threading	1	0	1	1	0	0
g) Medium threaded	0	0	1	1	1	0
h) Completing load	1	0	1	1	1	0
i) Load complete (e.g., DT device ready)	0	0	1	1	1	1

Load states (a) and (i) shall be supported by the ADC device server. States (b) through (h) should be supported to accurately reflect the states used by the DT device. Load states may not be reported in the order listed in table 1.

To indicate an error in any of the listed states, or to report a state not listed, the RRQST bit in the very high frequency data log parameter shall be set to one and the INXTN bit shall be set to zero.

The DT device shall set the INXTN bit is set to zero when the DT device requires an external stimulus (e.g., a command or medium movement) to attempt to reach another state.

Load state (a) represents an empty DT device, available for loading by the automation device.

Load state (b) represents initial placement of a medium into the DT device by the automation device. Depending on the DT device's design, medium present may also be detected and reported coincident with load state (b). An additional external stimulus is required to leave load state (b) (e.g., medium movement caused by the automation device).

Load state (c) represents detection and acknowledgement by the DT device of medium presence, and that the DT device may now assume control of the medium and that the automation device should relinquish control of robotic access (e.g., this state may be reflected after medium movement caused by the automation device). An additional external stimulus is required to leave load state (c) (e.g., a load request from the automation device).

Load state (d) represents a medium loading under the control of the DT device (e.g., to seat the medium).

Load state (e) represents a seated medium. An additional external stimulus is required to leave load state (e) (e.g., a command from the automation device or a LOAD UNLOAD command (see SSC) to the RMC device server). Load state (e) may be used in conjunction with MAM access.

Load state (f) represents a medium threading under control of the DT device.

Load state (g) represents a threaded medium. An additional external stimulus is required to leave load state (g) (e.g., a command from the automation device).

Load state (h) represents any additional processing that may be done by the DT device after threading the medium, but prior to the load being fully complete (e.g., allow data access).

Load state (i) represents the completion of the load operation (e.g., the DT device being in the SCSI READY state, microcode image or cleaning medium loaded).

An example showing use of a few of the states is given in table 2.

Table 2 — Load example

Load event	Very high frequency data log parameter field					
	INXTN	RAA	MPRSNT	MSTD	MTHRD	MOUNTED
1) DT device initialized, no medium present	0	1	0	0	0	0
2) Initial medium placement into DT device	0	1	0	0	0	0
3) After the automation device pushes a medium into DT device, now seating	1	0	1	0	0	0
4) After seating, medium now threading	1	0	1	1	0	0
5) Medium threaded, completing load	1	0	1	1	1	0
6) Load complete (e.g., DT device ready)	0	0	1	1	1	1

In this example, the DT device is loaded by the automation device first placing a medium into the DT device, then pushing the medium far enough into the DT device so that the DT device engages the medium and completes the operation in one continuous motion.

1) The load sequence begins with the DT device initialized, no medium present and robotic access allowed;
2) The automation device then places the medium into the DT device, which is not yet recognized by the DT device;
3) After the initial placement, the automation device pushes the medium into the DT device, such that medium presence is detected and the DT device assumes control of the medium and seats it;
4) The DT device continues transitioning through states as it threads the medium;
5) After threading, the DT device has some final firmware preparations to make; and
6) The load is complete.

4.2.4.2 Unload states

Table 3 defines the states that may be reported in the very high frequency data log parameter in the DT Device Status log page during unload operations (see 6.1.2.2). This information allows automation devices to coordinate loading and unloading of a medium with the DT device, and to obtain DT device activity status.

Table 3 — Unload states

Unload state	Very high frequency data log parameter field					
	INXTN	RAA	MPRSNT	MSTD	MTHRD	MOUNTED
a) DT device ready	0	0	1	1	1	1
b) DT device rewinding	1	0	1	1	1	0
c) Medium unthreaded, still unloading	1	0	1	1	0	0
d) Medium unseated, unloading or ejecting	1	0	1	0	0	0
e) DT device unloaded (hold point), seated	0	0	1	1	0	0
f) DT device unloaded (hold point), unseated	0	0	1	0	0	0
g) Medium ejected, presence detected	0	1	1	0	0	0
h) Medium ejected, presence not detected	0	1	0	0	0	0

Unload states (a) and (h) shall be supported by the ADC device server. States (b) through (g) should be reported to accurately represent the states used by the DT device.

To indicate an error in any of the listed states, or to report a state not listed, the RRQST bit in the VHF data descriptor shall be set to one and the INXTN bit shall be set to zero.

Unload state (a) represents the initial DT device state prior to receiving a request to unload.

Unload state (b) represents the initial DT device state after receiving a request to unload.

Unload state (c) represents the DT device state during the unload operation after the medium has been unthreaded.

Unload state (d) represents the DT device state during the unload operation after the medium has been unseated and the DT device state during the eject operation.

Unload state (e) represents the DT device state after unloading to the hold point, where the medium is still seated. An external stimulus (e.g., a request to eject or load) is needed to leave unload state (e).

Unload state (f) represents the DT device state after unloading to the hold point, where the medium is also unseated. An external stimulus (e.g., a request to eject or load) is needed to leave unload state (f).

Unload state (g) represents the DT device state after the medium is unloaded, ejected, and the DT device is still able to report medium present until the medium is completely removed.

Unload state (h) represents the DT device state after the medium is ejected and the presence of the medium is not detected (i.e., the DT device either does not support detection of medium presence at this state or the medium has been removed).

As an example, an unload to the hold point sequence may use states (a), (b), (c) and (e), or alternatively (a), (b), (c), (d), and (f). An unload to eject sequence may use states (a), (b), (c), (d), and (h).

4.2.5 Sense data masking

In the process of loading a medium into a DT device, it may be necessary to retry the operation in order to overcome transient failures. This may require removing and re-inserting the medium into the DT device. If an application client is testing the status of the RMC device server, the application client may see an initial failure even though the loading eventually succeeds and the MOVE MEDIUM command to the SMC device returns GOOD status.

If the RMC device server's true status is not reported to the application client during automation device-initiated loads, the automation device may retry the load operation while the RMC device server reports that the load operation is still in progress to application clients. This behavior is termed sense data masking and its implementation is optional.

If sense data masking is enabled, the RMC device server shall report SCSI status and sense data consistent with a normal loading operation.

If implemented, the DT device shall enable sense data masking when the DT device begins loading a medium. The DT device shall disable sense data masking after any of the following occur:

a) Loading succeeds;
b) Loading fails and for a time of sense masking timeout value (SM_TOV) the automation device issues no medium access commands and does not remove and re-insert the medium; or
c) The ADC device server receives a NOTIFY DATA TRANSFER DEVICE command with the LDFAIL bit set to one (see 5.2).

During the SM_TOV period, if either the automation application client issues a medium access command or the automation device removes and re-inserts the medium, then the DT device shall not disable sense data masking. The SM_TOV timer shall be restarted when either the medium is re-inserted or the command is received. If the medium is removed and SM_TOV expires before the medium is re-inserted, then the DT device shall disable sense data masking.

After disabling sense data masking, the RMC device server shall report SCSI status and sense data consistent with successful or unsuccessful completion of loading.

The value of SM_TOV is vendor-specific.

4.2.6 TapeAlert application client interface

The ADC device server supports a modified version of TapeAlert specified in SSC-2. As supported by the ADC device server, the TapeAlert flags represent states, and the state flags are not set to zero upon retrieval of the TapeAlert Response log page. Instead, the state flags are set to zero upon a change of the condition involved with the state (see table 4). The ADC device server also provides a mechanism to notify an ADC application client whenever a TapeAlert flag changes value (see 6.1.2.2).

This approach facilitates accurate reporting of the conditions encountered by the DT device and allows the automation device to manage the information directly. The ADC device server does not maintain unique TapeAlert information for each initiator port, and the state flags are not affected by port events (e.g., port logins).

The application client is responsible for determining which flags have changed state upon subsequent retrieval of the TapeAlert Response log page, requiring the application client to maintain at least one previously retrieved TapeAlert Response log page in order to detect differences. The application client may maintain a state change history.

In conjunction with the VHF data descriptor (see 6.1.2.2), the TapeAlert state flags are a primary source of information about the DT device, and should be used to obtain DT device status information. Application clients may retrieve TapeAlert state flags at any time; application clients should retrieve TapeAlert state flags when the ADC device server sets the TapeAlert Flags Changed (TAFC) bit to one in the VHF data descriptor.

The ADC device server shall maintain the TapeAlert state flags independently of the TapeAlert flags maintained by the RMC device server. Retrieving the state flags from the ADC device server shall not set the state flags maintained by the ADC device server to zero and shall not set the TapeAlert flags maintained by the RMC device server to zero. Retrieving TapeAlert flags from the RMC device server shall not set the state flags maintained by the ADC device server to zero.

The TapeAlert state flags shall be set to zero upon a logical unit reset to either the RMC or ADC device servers. The state flags shall be reported as new states following the power cycle as conditions warrant. In addition to a power cycle, other conditions and events that clear state flags are described in table 4.

Table 4 — Additional TapeAlert state flag clearing conditions (part 1 of 2)

Flag	Name	Additional clearing condition
01h	Read warning	Start of next medium load
02h	Write warning	Start of next medium load
03h	Hard error	Start of next medium load
04h	Media	Start of next medium load
05h	Read failure	Start of next medium load
06h	Write failure	Start of next medium load
07h	Media life	Start of next medium load
08h	Not data grade	Start of next medium load
09h	Write protect	Start of next medium load or removal of write protect
0Ah	No removal	After medium removal allowed
0Bh	Cleaning media	Start of next medium load
0Ch	Unsupported format	Start of next medium load or format change
0Dh	Recoverable mechanical cartridge failure	Start of next medium load
0Eh	Unrecoverable mechanical cartridge failure	After service resolution
0Fh	Memory chip in cartridge failure	Start of next medium load
10h	Forced eject	Start of next medium load
11h	Read only format	Start of next medium load or format change
12h	Tape directory corrupted on load	Start of next medium load
13h	Nearing media life	Start of next medium load

Table 4 — Additional TapeAlert state flag clearing conditions (part 2 of 2)

Flag	Name	Additional clearing condition
14h	Clean now	After successful cleaning or cause resolved
15h	Clean periodic	After successful cleaning
16h	Expired cleaning media	Start of next medium load
17h	Invalid cleaning tape	Start of next medium load
18h	Retension requested	After successful retension
19h	Dual-port interface error	After interface returns to operation
1Ah	Cooling fan failure	After service resolution
1Bh	Power supply failure	After service resolution
1Ch	Power consumption	After power consumption returns to within specification
1Dh	Drive maintenance	After service resolution
1Eh	Hardware A	After service resolution
1Fh	Hardware B	After service resolution
20h	Interface	After interface returns to operation
21h	Eject media	Start of next medium load
22h	Down-load fail	Start of next firmware download
23h	Drive humidity	After humidity returns to within specification
24h	Drive temperature	After temperature returns to within specification
25h	Drive voltage	After voltage returns to within specification
26h	Predictive failure	After service resolution
27h	Diagnostics required	After service resolution
28h- 2Eh	Obsolete	
2Fh- 31h	Reserved	
32h	Lost statistics	Start of next medium load
33h	Tape directory invalid at unload	Start of next medium load
34h	Tape system area write failure	Start of next medium load
35h	Tape system area read failure	Start of next medium load
36h	No start of data	Start of next medium load
37h	Loading failure	Start of next medium load
38h	Unrecoverable unload failure	After service resolution
39h	Automation interface failure	After service resolution
3Ah	Firmware failure	After service resolution
3Bh– 40h	Reserved	

Many of the state flags are set to zero at the start of the next medium load, which is defined to be the DT device entering the next load state upon transition from load state (a) (see table 1). The next load state entered varies by DT device. If a load sequence is initiated from an unload hold point (i.e., unload state (e) or (f) in table 3), start of

next medium load is defined to be the DT device entering the next load state upon transition from load states (c) or (e) (see table 3).

Other state flags are set to zero following resolution through service intervention. Service resolution is beyond the scope of this standard.

4.2.7 Medium Auxiliary Memory attributes

ADC device servers shall not modify attributes of type Host. If the automation device is required to modify one of these attributes, the automation device shall issue the command (see SPC-3, WRITE ATTRIBUTE) to the RMC logical unit.

4.2.8 Enabling and disabling DT device primary ports

An ADC device server shall allow the DT device primary port(s) to be disabled and enabled via MODE SELECT commands (see SPC-3) that modify the ADC Device Server Configuration mode page (see 6.2.2).

When in the disabled state, the DT device primary port shall not accept SCSI commands or task management requests and shall not respond to transport-level actions (e.g., SCSI Bus Reset, the Fibre Channel Loop Initialization or Loop Port Enable primitives).

The disabling of a DT device primary port shall be treated as an I_T nexus loss event for any existing nexii associated with the disabled DT device primary port, as specified in SAM-3. If the command disabling a DT device primary port is received through the DT device primary port being disabled, then the ADC device server shall return command completion status before disabling the DT device primary port.

4.2.9 Sequential mode operation

Some automation devices support a sequential mode of operation. When an automation device is configured in sequential mode, there is no SMC device server accessible in the SCSI domain. In sequential mode the automation device implicitly replaces a medium in the DT device with the next sequential medium in the automation device. A typical sequence of operations follows:

1) The RMC device server receives and processes an unload command;
2) The automation device detects that an unload of the medium has occurred;
3) The automation device removes the current medium from the DT device and returns the medium to its storage element;
4) The automation device moves the next medium from a storage element to the DT device; and
5) The RMC device server becomes ready for access.

The automation device may use the HIU bit in the VHF data descriptor (see 6.1.2.2) to aid in the detection of an unloaded medium in step 2 above.

5 Commands for automation drive interface devices

5.1 Summary of commands for automation drive interface devices

The command set for automation drive interface devices shall be as shown in table 5.

Table 5 — Command set for automation drive interface (part 1 of 2)

Command name	Operation code	Required	Reference
INQUIRY	12h	Mandatory	SPC-2
LOAD UNLOAD	1Bh	Mandatory	SSC
LOG SELECT	4Ch	Optional	SPC-2
LOG SENSE	4Dh	Mandatory	SPC-2
MODE SELECT(6)	15h	Optional	SPC-3
MODE SELECT(10)	55h	Mandatory	SPC-3
MODE SENSE(6)	1Ah	Optional	SPC-3
MODE SENSE(10)	5Ah	Mandatory	SPC-3
NOTIFY DATA TRANSFER DEVICE	9Fh/1Fh [a]	Mandatory	5.2
READ ATTRIBUTE	8Ch	Mandatory	SPC-3
READ BUFFER	3Ch	Optional	SPC-2
RECEIVE DIAGNOSTIC RESULTS	1Ch	Optional	SPC-2
REPORT DENSITY SUPPORT [c,d]	44h	Mandatory	SSC
REPORT DEVICE IDENTIFIER	A3h/05h [a]	Optional	SPC-2
REPORT LUNS	A0h	Mandatory	SPC-2
REPORT SUPPORTED OPERATION CODES	A3h/0Ch [a]	Mandatory	SPC-3
REPORT SUPPORTED TASK MANAGEMENT FUNCTIONS	A3h/0Dh [a]	Optional	SPC-3
REPORT TARGET PORT GROUPS	A3h/0Ah [a]	Optional	SPC-3
REQUEST SENSE	03h	Mandatory	SPC-2
SEND DIAGNOSTIC [e]	1Dh	Mandatory	SPC-2
SET DEVICE IDENTIFIER	A4h/06h [a]	Optional	SPC-2

[a] This command is defined by a combination of operation code and service action. The operation code value is shown preceding the slash and the service action value is shown after the slash.

[b] This command is subject to the readiness of the removable medium (i.e., the logical unit is able to accept these identified medium-access commands without returning CHECK CONDITION status). Other commands may be subject to readiness of the removable medium due to vendor-specific features.

[c] Same as (b), except only when the MEDIA bit is set to one.

[d] See SSC-3 to provide support for medium types.

[e] Only self test shall be mandatory.

Table 5 — Command set for automation drive interface (part 2 of 2)

Command name	Operation code	Required	Reference
SET TARGET PORT GROUPS	A4h/0Ah [a]	Optional	SPC-3
TEST UNIT READY [b]	00h	Mandatory	SPC-2
WRITE ATTRIBUTE	8Dh	Optional	SPC-3
WRITE BUFFER	3Bh	Optional	SPC-2

[a] This command is defined by a combination of operation code and service action. The operation code value is shown preceding the slash and the service action value is shown after the slash.

[b] This command is subject to the readiness of the removable medium (i.e., the logical unit is able to accept these identified medium-access commands without returning CHECK CONDITION status). Other commands may be subject to readiness of the removable medium due to vendor-specific features.

[c] Same as (b), except only when the MEDIA bit is set to one.

[d] See SSC-3 to provide support for medium types.

[e] Only self test shall be mandatory.

5.2 NOTIFY DATA TRANSFER DEVICE command

The NOTIFY DATA TRANSFER DEVICE command (see table 6) is used to notify the ADC device server of specific events. The NOTIFY DATA TRANSFER DEVICE command does not represent the complete current state of the automation device and is not intended to be sent upon every change in the automation device's state.

Table 6 — NOTIFY DATA TRANSFER DEVICE command

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (9Fh)							
1	Reserved			SERVICE ACTION (1Fh)				
2	Reserved							LDFAIL
3	Reserved				BUA	NRSC	IDC	MDC
4	ASC							
5	ASCQ							
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved							
11	Reserved							
12	Reserved							
13	Reserved							
14	Reserved							
15	CONTROL							

The load failed (LDFAIL) bit shall be set to one if the automation device has detected that the RRQST bit in the VHF data descriptor (see 6.1.2.2) is set to one while the DT device is attempting to load a medium, and the automation device has completed all recovery attempts. A LDFAIL bit set to zero indicates that a load failure has not been detected.

The bits in byte 3 are used to indicate that cached SMC data may require refreshing (see 4.2.3.5).

A mode data changed (MDC) bit set to one indicates that the contents of a mode page or mode parameter header reported by the remote SMC device server have changed. Upon receipt of this notification, the use of any cached mode data by the local SMC device server (see 4.2.3.2) shall be discontinued until the cached mode data has been refreshed. A MDC bit set to zero indicates that the contents have not changed.

An INQUIRY data changed (IDC) bit set to one indicates that the contents of the standard INQUIRY data or of any VPD page reported by the remote SMC device server have changed. Upon receipt of this notification, the use of any cached INQUIRY data or VPD pages shall be discontinued until the cached data or pages have been refreshed. An IDC bit set to zero indicates that the contents have not changed.

A not ready state changed (NRSC) bit set to one indicates that the remote SMC device server has entered the not accessible state, per the description of caching SMC data and status (see 4.2.3.5). A NRSC bit set to one may also indicate that the remote SMC device server was already in the not accessible state and the sense data changed.

When the NRSC bit is set to one, the ASC and ASCQ fields shall contain additional sense data appropriate to the condition. Upon receipt of this notification, the cached ready state and additional sense data shall be updated. An NRSC bit set to zero indicates that the remote SMC device server has not entered the not accessible state, nor has the additional sense data changed if already in the not accessible state.

A broadcast unit attention (BUA) bit set to one indicates that the ASC and ASCQ fields shall contain the additional sense data to be used by the local SMC device server to establish a unit attention condition for all initiator ports accessible via its DT device primary ports. When the additional sense data is NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED, it indicates that the remote SMC device server has entered the accessible state.

It is not valid for the NRSC bit and the BUA bit to both be set to one. If the NRSC bit and the BUA bit are both set to zero, then it is not valid for the ASC field or ASCQ field to be set to a non-zero value. If the NRSC bit and the BUA bit are both set to one, or if both bits are set to zero and either the ASC field or the ASCQ field is not zero, then the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST and the additional sense code shall be set to INVALID FIELD IN CDB.

See SAM-2 for a description of the CONTROL byte.

If a NOTIFY DATA TRANSFER DEVICE command is received from an initiator port with a pending unit attention condition (i.e., before the ADC device server reports CHECK CONDITION status), the ADC device server shall perform the NOTIFY DATA TRANSFER DEVICE command and shall not clear the unit attention condition.

The automation application client shall send the NOTIFY DATA TRANSFER DEVICE command when any of the events that the NOTIFY DATA TRANSFER DEVICE command reports have occurred. Multiple events may be reported in the same NOTIFY DATA TRANSFER DEVICE command. The command shall report only those events that have not been previously reported.

6 Parameters for automation drive interface devices

6.1 Log parameters

6.1.1 Log parameters overview

This subclause defines the log pages and log parameters for ADC device servers.

The log page codes for ADC device servers are defined in table 7.

Table 7 — Log page codes (part 1 of 2)

Page Code	Description	Required	Reference
00h	Supported log pages	Mandatory	SPC-2
01h	Buffer Overrun/Underrun log page	Optional	SPC-2
02h	Write Error Counter log page	Optional	SPC-2
03h	Read Error Counter log page	Optional	SPC-2
04h	Read Reverse Error Counter log page	Optional	SPC-2
05h	Verify Error Counter log page	Optional	SPC-2
06h	Non-Medium Error log page	Optional	SPC-2
07h	Last *n* Error Events log page	Optional	SPC-2
08h	Format Status log page	Optional	SPC-3
09h - 0Ah	Reserved		
0Bh	Last *n* Deferred Error Events log page	Optional	SPC-2
0Ch	Sequential-Access Device log page	Optional	SSC-2
0Dh	Temperature log page	Optional	SPC-2
0Eh	Start-Stop Cycle Counter log page	Optional	SPC-2
0Fh	Application Client log page	Optional	SPC-2
10h	Self-test Results log page	Optional	SPC-2
11h	DT Device Status log page	Mandatory	6.1.2
12h	TapeAlert Response log page	Mandatory	6.1.3
13h	Requested Recovery log page	Mandatory	6.1.4
14h	Device Statistics log page	Optional	6.1.5

Table 7 — Log page codes (part 2 of 2)

15h - 2Eh	Reserved		
2Fh	Informational Exceptions log page	Optional	SPC-3
30h - 3Eh	Vendor-specific log pages		
3Fh	Reserved		

Log parameters of ADC and RMC device servers in the same DT device shall be independent (i.e., changes to log parameters caused by either LOG SELECT commands or other DT device operation of an RMC device server shall not be reflected by changes in the corresponding parameters reported by the ADC device server. Changes in log parameters caused by either LOG SELECT commands or other DT device operation of an ADC device server shall not be reflected by changes in the corresponding parameters reported by the RMC device server).

6.1.2 DT Device Status log page

6.1.2.1 DT Device Status log page overview

The DT Device Status log page (see table 8) defines log information pertaining to the DT device and DT device primary ports.

Table 8 — DT Device Status log page

Bit / Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (11h)					
1	Reserved							
2	(MSB)		PAGE LENGTH (n-3)					
3								(LSB)
4	DT Device Status log parameters							
n								

See SPC-3 for a description of the PAGE CODE and PAGE LENGTH fields.

Table 9 defines the DT Device Status log page parameter codes.

Table 9 — DT Device Status log page parameter codes

Parameter code	Description	Reference
0000h	Very high frequency data	6.1.2.2
0001h	Very high frequency polling delay	6.1.2.3
0002h - 00FFh	Reserved	
0100h - 0200h	DT device primary port status	6.1.2.4
0201h - 7FFFH	Reserved	
8000h - FFFFh	Vendor-specific	

6.1.2.2 Very high frequency data log parameter

The very high frequency data log parameter format is shown in table 10.

Table 10 — Very high frequency data log parameter format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1		PARAMETER CODE (0000h)						(LSB)
2	DU (0)	DS (1)	TSD (0)	ETC (0)	TMC (0)		LBIN (1)	LP (1)
3	PARAMETER LENGTH (04h)							
4								
...		VHF DATA DESCRIPTOR						
7								

The PARAMETER CODE field shall be set to 0000h to indicate the very high frequency data log parameter.

See SPC-3 for descriptions of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. These bits and fields shall be set to the values shown in table 10.

The PARAMETER LENGTH field shall be set to 04h to allow transfer of the complete parameter.

The VHF DATA DESCRIPTOR field is defined in table 11. Returned data shall reflect the last known values since the DT device initialized.

NOTE 1 In addition to reliance on indication of initialization completion, reliance on returned values should also take into consideration conditions indicated by changes in Tape Alert flag status, and process those first as needed.

Table 11 — VHF DATA DESCRIPTOR field

Bit / Byte	7	6	5	4	3	2	1	0
0	PAMR	HIU	MACC	CMPR	WRTP	CRQST	CRQRD	DINIT
1	INXTN	Rsvd	RAA	MPRSNT	Rsvd	MSTD	MTHRD	MOUNTED
2	DT DEVICE ACTIVITY							
3	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	RRQST	INTFC	TAFC

A DT device initialized (DINIT) bit set to one indicates that the DT device is able to return valid very high frequency data. A DINIT bit set to zero indicates DT device initialization is required or incomplete. The DINIT bit should be set to one before relying on any other bits in the very high frequency data log parameter.

A clean required (CRQRD) bit set to one indicates that a head cleaning operation is required before a data medium is able to reach load state (i) (see 4.2.4.1), and that normal operation may not be possible if the head cleaning operation is not performed. A CRQRD bit set to zero indicates that urgent cleaning is not required. The CRQRD bit shall take priority over the CRQST bit. It shall not be considered an error for the CRQRD bit and the CRQST bit to both be set to one.

A clean requested (CRQST) bit set to one indicates that the DT device has requested a head cleaning. A CRQST bit set to zero indicates that no cleaning is requested.

A write protect (WRTP) bit set to one indicates that any currently present medium is physically write protected. A WRTP bit set to zero indicates that any currently present medium is not physically write protected. The WRTP bit is only valid if the MPRSNT bit is set to one. The WRTP bit should be set to zero if the MPRSNT bit is set to zero.

NOTE 2 Physically write protected refers to any mechanism used within the medium shell itself to write protect the medium (e.g., sliding windows or tabs) and not logical states of write protection caused by commands to the DT device.

A compress (CMPR) bit set to one indicates that the DT device currently has data compression enabled. A CMPR bit set to zero indicates that compression is not enabled.

A medium auxiliary memory accessible (MACC) bit set to one indicates that the medium is located at a position where the Medium Auxiliary Memory (MAM) is accessible. A MACC bit set to zero indicates that the MAM is not accessible. If the MACC bit is set to one, the ADC device server shall also support commands to access the MAM. If the MACC bit is supported the MACC bit should only be set to one if the MPRSNT bit is set to one. The MACC bit is only applicable for drives and media that support MAM.

The host initiated unload (HIU) bit shall be set to one when the drive reaches any one of the unload states (e) - (h) (see table 3) due to the RMC device server receiving a LOAD UNLOAD command (see SSC-2) with the LOAD bit set to zero. The HIU bit shall be set to zero when the drive transitions to any state in table 1 or table 3 other than unload states (e) - (h) in table 3. The HIU bit may be set to zero following a logical unit reset of the RMC or ADC device servers.

NOTE 3 The HIU bit may facilitate sequential mode operation (see 4.2.9).

The prevent/allow medium removal (PAMR) bit shall be set to one when removal of the medium in the DT device is prevented as the result of the RMC device server processing a PREVENT/ALLOW MEDIUM REMOVAL command (see SPC-2 or the relevant command set standard). The PAMR bit shall be set to zero when removal of the medium in the DT device is allowed as defined by the PREVENT/ALLOW MEDIUM REMOVAL command.

A MOUNTED bit set to one indicates that the DT device is in load state (i) (see 4.2.4.1). The MOUNTED bit set to one may correspond to the RMC device server being able to respond to a TEST UNIT READY command with a status of GOOD, however when a cleaning or microcode image medium is loaded the RMC device server may respond to a TEST UNIT READY command with a CHECK CONDITON with the sense key set to NOT READY. A MOUNTED bit set to zero indicates that the DT device is not in load state (i).

A medium threaded (MTHRD) bit set to one indicates that the medium has been threaded by the DT device, such that tape motion operations are possible. A MTHRD bit set to zero indicates that the medium has not been threaded.

NOTE 4 The value of the MTHRD bit may or may not correspond to the DT device responding with a status of GOOD to a TEST UNIT READY command (see SPC-2), as additional processing may be required by the DT device after threading before the logical unit becomes ready.

A medium seated (MSTD) bit set to one indicates that the medium is mechanically seated within the loading mechanism (i.e., the physical loading process has completed). A MSTD bit set to zero indicates that the medium is not seated, and that further mechanical motion remains in order to complete the loading process, exclusive of tape threading.

A medium present (MPRSNT) bit set to one indicates that the DT device detects the presence of a medium. A MPRSNT bit set to zero indicates that the DT device does not detect a medium present.

A robotic access allowed (RAA) bit set to one indicates that the automation device may move a medium to or from the DT device. A RAA bit set to zero indicates that the automation device should not move a medium to or from the

DT device. The DT device should indicate that access is allowed by the robotics if a medium may be successfully inserted into or removed from the DT device.

NOTE 5 The RAA bit is not intended to reflect the value of any PREVENT/ALLOW MEDIUM REMOVAL command settings (see SPC-2), nor the ability of the automation device to issue commands to the DT device.

The in transition (INXTN) bit governs the remaining bits within byte 1 to indicate the stability of the values returned and whether state transitions are taking place. An INXTN bit set to one indicates that the state currently reflected by the remaining bits in byte 1 is in transition, because the DT device is transitioning to another state. An INXTN bit set to zero indicates that the DT device is in the state reflected by the remaining bits in byte 1 and is making no attempt to leave this state. When the recovery requested (RRQST) bit is set to one, the INXTN bit shall be set to zero.

The DT DEVICE ACTIVITY field is used to describe the current activity of the DT device (see table 12).

Table 12 — DT DEVICE ACTIVITY field values

Value	Description
00h	No DT device activity
01h	Cleaning operation in progress
02h	Medium is being loaded
03h	Medium is being unloaded
04h	Other medium activity
05h	Reading from medium
06h	Writing to medium
07h	Locating medium
08h	Rewinding medium
09h	Erasing medium
0Ah	Formatting medium
0Bh	Calibrating medium
0Ch	Other DT device activity
0Dh-7Fh	Reserved
80h-FFh	Vendor-specific DT device activity

A TapeAlert state flag changed (TAFC) bit set to one indicates that at least one TapeAlert state flag has changed from its previous value since the last retrieval of the TapeAlert Response log page (see 6.1.3) by this I_T nexus. The ADC device server sets the TAFC bit to zero after retrieval of the TapeAlert Response log page by this I_T nexus. A TAFC bit set to zero indicates that no TapeAlert state flag has changed. There may not be any difference in the TapeAlert state flags upon retrieval if the state changed again between the time of reporting through the TAFC bit and retrieving the TapeAlert Response log page. This should not be considered an error. The TAFC bit should be processed following the DINIT bit. Pending TapeAlert state flags may affect the reliability of the values returned in other bits within the VHF DATA DESCRIPTOR.

An interface changed (INTFC) bit set to one indicates that one or more fields in the DT device primary port status log parameters (see 6.1.2.4) have changed since the last retrieval of any of the DT device primary port status log parameters from the DT Device Status log page by this I_T nexus. An INTFC bit set to zero indicates that one or more fields in the DT Device Primary Port Status log parameters have not changed since the last retrieval of any of the DT device primary port status log parameters by this I_T nexus. The INTFC bit is set to zero after retrieval of any of the DT device primary port status log parameters from the DT Device Status log page by this I_T nexus.

The recovery requested (RRQST) bit shall be set to one to indicate that the DT device has detected an error and that one or more requested recovery procedures are available via the Requested Recovery log page (see 6.1.4). A RRQST bit set to zero indicates that no recovery procedure is requested. The RRQST bit shall remain set to one as long as a recovery procedure is available. When the RRQST bit is set to one, the INXTN bit shall be set to zero.

NOTE 6 The Requested Recovery log page may indicate that a recovery procedure is not requested or not defined.

6.1.2.3 Very high frequency polling delay log parameter

The very high frequency polling delay log parameter format is shown in table 13.

Table 13 — Very high frequency polling delay log parameter format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				PARAMETER CODE (0001h)				(LSB)
2	DU (0)	DS (1)	TSD (0)	ETC (0)	TMC (0)		LBIN (1)	LP (1)
3	PARAMETER LENGTH (02h)							
4	(MSB)							
5				VHF POLLING DELAY				(LSB)

The PARAMETER CODE field shall be set to 0001h to indicate the very high frequency polling delay log parameter.

See SPC-3 for descriptions of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. These bits and fields shall be set to the values shown in table 13.

The PARAMETER LENGTH field shall be set to 02h to allow transfer of the complete parameter.

The VHF POLLING DELAY field indicates the minimum delay in milliseconds the automation device should wait before requesting another DT Device Status log page.

6.1.2.4 DT device primary port status log parameter(s)

6.1.2.4.1 DT device primary port status log parameter(s) overview

The DT device primary port status log parameter(s) format is shown in table 14.

Table 14 — DT device primary port status log parameter(s) format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				PARAMETER CODE				(LSB)
2	DU (0)	DS (1)	TSD (0)	ETC (0)	TMC (0)		LBIN (1)	LP (1)
3	PARAMETER LENGTH (n-3)							
4				DT device primary port status data				
n								

The PARAMETER CODE field contains a value from 0101h to 0200h, as assigned by the DT device, that uniquely identifies the DT device primary port relative to other DT device primary ports in the DT device, independent of port type. Once assigned, the PARAMETER CODE value for a DT device primary port shall not be changed as long as the DT device primary port remains on the DT device. For each DT device primary port, the PARAMETER CODE value shall be equal to 0100h plus the value of the RELATIVE TARGET PORT field associated with that DT device primary port (see 6.2.2.3.2).

See SPC-3 for descriptions of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. These bits and fields shall be set to the values shown in table 14.

The PARAMETER LENGTH field specifies the length in bytes of DT device primary port status data that follows.

The DT device primary port status data are described in this subclause.

6.1.2.4.2 Fibre Channel port status data

The format of the DT device primary port status data for a Fibre Channel port is shown in table 15.

Table 15 — Fibre Channel port status data format

Bit / Byte	7	6	5	4	3	2	1	0
0	CURRTOP	CURRENT SPEED			LC	CONFLICT	SIGNAL	PIC
1	(MSB)							
2		CURRENT N_PORT_ID						
3								(LSB)
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved	CURRENT FC-AL LOOP ID						

A port initialization complete (PIC) bit set to one indicates that the FC_Port state machine is in the ACTIVE state (see FC-FS) and the DT device primary port is operating in point-to-point topology, or the most recent Loop Initialization Process (LIP) has completed successfully (see FC-AL-2). A PIC bit set to zero indicates that the DT device primary port is not in the ACTIVE state and is not synchronized (see FC-FS), or has not successfully completed the most recent LIP.

A SIGNAL bit set to one indicates that a signal is detected at the DT device primary port (e.g., detection of light for an optical medium). A SIGNAL bit set to zero indicates a signal is not detected.

A CONFLICT bit set to one indicates that another device has the required Hard AL_PA (see FC-AL-2) or that no AL_PA is available for the DT device primary port. A CONFLICT bit set to zero indicates there is no AL_PA conflict.

A login complete (LC) bit set to one indicates that at least one initiator port has completed process login (PRLI) with the DT device (see FCP-2) on the DT device primary port. A LC bit set to zero indicates that a login has not successfully completed through the PRLI phase on the DT device primary port.

The CURRENT SPEED field indicates the bit rate in which the DT device primary port is operating currently. Table 35 defines the valid values for CURRENT SPEED. The CURRENT SPEED field shall be ignored when the PIC bit is set to zero.

A current topology (CURRTOP) bit set to one indicates the DT device primary port is operating currently in point to point mode. A CURRTOP bit set to zero indicates the DT device primary port is operating currently in arbitrated loop mode. The CURRTOP bit shall be ignored when the PIC bit is set to zero.

The CURRENT N_PORT_ID field indicates the 24-bit N_Port_ID (see FC-FS) that is assigned to the DT device primary port. The CURRENT N_PORT_ID field shall be ignored when the PIC bit is set to zero.

The CURRENT FC-AL LOOP ID field indicates the loop identifier (see FC-AL-2) that is assigned to the DT device primary port. The CURRENT FC-AL LOOP ID field shall be ignored when the PIC bit is set to zero or when the CURRTOP bit is set to one.

6.1.2.4.3 SCSI parallel interface port status data

The format of the DT device primary port status data for a SCSI port that supports parallel transfers (see SPI-5) is shown in table 16.

Table 16 — SCSI parallel interface port status data format

Bit / Byte	7	6	5	4	3	2	1	0
0	Reserved					CURRENT BUS MODE		Reserved
1	Reserved							
2	MOST RECENT TRANSFER PERIOD FACTOR							
3	CURRENT SCSI ADDRESS							

The CURRENT BUS MODE field indicates the bus mode in which the DT device primary port is operating (see SPI-5).

The MOST RECENT TRANSFER PERIOD FACTOR field indicates the transfer period factor that was negotiated most recently (see SPI-5).

The CURRENT SCSI ADDRESS field indicates the 8-bit address that is assigned to the DT device primary port.

6.1.3 TapeAlert Response log page

Table 17 describes the TapeAlert Response log page. The parameter fields represent the various TapeAlert state flags (see 4.2.6). Table 4 contains a description of the corresponding TapeAlert state flags and the conditions that set each state flag to zero.

Table 17 — TapeAlert Response log page

Bit / Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (12h)					
1	Reserved							
2	(MSB)		PAGE LENGTH (000Ch)					
3								(LSB)
4	(MSB)		PARAMETER CODE (0000h)					
5								(LSB)
6	DU (0)	DS (1)	TSD (0)	ETC (0)	TMC (0)		LBIN (1)	LP (1)
7	PARAMETER LENGTH (08h)							
8	FLAG01	FLAG02	FLAG03	FLAG04	FLAG05	FLAG06	FLAG07	FLAG08
9	FLAG09	FLAG10	FLAG11	FLAG12	FLAG13	FLAG14	FLAG15	FLAG16
10	FLAG17	FLAG18	FLAG19	FLAG20	FLAG21	FLAG22	FLAG23	FLAG24
11	FLAG25	FLAG26	FLAG27	FLAG28	FLAG29	FLAG30	FLAG31	FLAG32
12	FLAG33	FLAG34	FLAG35	FLAG36	FLAG37	FLAG38	FLAG39	FLAG40
13	FLAG41	FLAG42	FLAG43	FLAG44	FLAG45	FLAG46	FLAG47	FLAG48
14	FLAG49	FLAG50	FLAG51	FLAG52	FLAG53	FLAG54	FLAG55	FLAG56
15	FLAG57	FLAG58	FLAG59	FLAG60	FLAG61	FLAG62	FLAG63	FLAG64

See SPC-3 for a description of the PAGE CODE field.

The PAGE LENGTH field shall be set to 000Ch to allow the transfer of the complete log page.

The PARAMETER CODE field shall be set to 0000h to indicate the single log parameter.

See SPC-3 for descriptions of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. These bits and fields shall be set to the values shown in table 17.

The PARAMETER LENGTH field shall be set to 08h to allow transfer of the complete parameter.

A FLAGXX bit set to one specifies the TapeAlert state flag is set. A FLAGXX bit set to zero specifies the TapeAlert state flag is not set.

6.1.4 Requested Recovery log page

6.1.4.1 Requested Recovery log page overview

Table 18 describes the Requested Recovery log page. When the DT device is unable to complete an action (e.g., a medium load or unload) the DT device may set the RRQST bit to one in the very high frequency data log parameter (see 6.1.2.2) to request that the automation device perform a recovery action. The application client is able to obtain a list of alternative requested recovery actions by reading the Requested Recovery log page..

Table 18 — Requested Recovery log page

Bit / Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (13h)					
1	Reserved							
2	(MSB)							
3	PAGE LENGTH (n-3)							(LSB)
4	Requested recovery log parameters							
n								

See SPC-3 for a description of the PAGE CODE field and the PAGE LENGTH field.

Table 19 defines the Requested Recovery log page parameter codes.

Table 19 — Requested Recovery log page parameter codes

Parameter code	Description	Reference
0000h	Recovery procedures	6.1.4.2
0001h - 7FFFh	Reserved	
8000h - FFFFh	Vendor-specific	

6.1.4.2 Recovery procedures log parameter

The recovery procedures log parameter format is shown in table 20.

Table 20 — Requested recovery log parameter format

0	(MSB)						
1	PARAMETER CODE (0000h)						(LSB)
2	DU (1)	DS (1)	TSD (1)	ETC (0)	TMC (0)	LBIN (1)	LP (1)
3	PARAMETER LENGTH (n-3)						
4	Recovery procedures						
n							

See SPC-3 for descriptions of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. These bits and fields shall be set to the values shown in table 20.

The PARAMETER LENGTH field indicates the number of recovery procedure bytes that follow.

The PARAMETER CODE field shall be set to 0000h to indicate the recovery procedures log parameter.

The recovery procedures specify a list of recovery procedures (see table 21) listed in order from the most preferred to the least preferred procedure. When multiple recovery procedures are available, the most preferred procedure shall be the first in the list (i.e., in byte 4), and the other procedures listed in decreasing order of preference. The automation device may select any recovery procedure, regardless of position in the list.

Each recovery procedure consists of one or more actions to be performed. When the INXTN bit of the VHF DATA DESCRIPTOR field (see 6.1.2.2) is set to one, the parameter shall report only code 00h (i.e., Recovery not requested). If a failure occurs in performing one of the actions in a procedure, an appropriate list of requested recovery procedures may be reported.

Recovery procedures do not persist across a power cycle.

Table 21 — Recovery procedures

Recovery Procedure	Description
00h	Recovery not requested
01h	Recovery requested, no recovery procedure defined
02h	Push medium
03h	Remove and re-insert medium
04h	Issue UNLOAD command, remove, and re-insert medium
05h	Cycle power to DT device
06h	Issue LOAD command
07h	Issue UNLOAD command
08h	Issue Logical Unit Reset request
09h	No recovery procedure defined. Contact service organization
0Ah	Issue UNLOAD command, remove, and quarantine medium
0Bh	Do not insert medium. Contact service organization
0Ch	Issue UNLOAD command, remove medium, and contact service organization
0Dh	Request creation of a DT device error log
0Eh	Retrieve a DT device error log
0Fh – 07Fh	Reserved
80h – FFh	Vendor-specific procedures

If the Requested Recovery log page is requested when the RRQST bit (see 6.1.2.2) is set to zero, then a recovery procedure of 00h (i.e., Recovery not requested) shall be reported.

If the requested recovery procedure may cause the DT device to eject the medium, the automation device shall ensure there is not conflict between the motion of a medium transport element and the medium before initiating that recovery action.

If the requested recovery procedure is 09h (i.e., Contact service organization), then the automation device shall not issue a load or unload command or attempt to manipulate the medium physically.

If the requested recovery procedure is 0Ah (i.e., Issue UNLOAD command, remove, and quarantine medium), then the medium should not be loaded in a DT device.

If the requested recovery procedure is 0Bh (i.e., Do not insert medium), a non-recoverable error has occurred and insertion of a medium may cause damage. If the 0Bh recovery procedure is requested, then the RAA bit (see 6.1.2.2) shall be set to zero, and no other recovery procedures shall be reported.

If the requested recovery procedure is 0Ch (i.e., Issue UNLOAD command, remove medium, and contact service organization), a non-recoverable error has occurred and insertion of a new medium may cause damage. When recovery procedure 0Ch is requested and the medium has subsequently been removed, then the RAA bit (see 6.1.2.2) shall be set to zero, and no other recovery procedures shall be reported.

6.1.5 Device Statistics log page

The Device Statistics log page (see table 22) defines data counters associated with utilization of the DT device. An ADC device server that implements the Device Statistics log page shall implement one or more of the defined parameters. Support for the individual parameters in the Device Statistics log page is optional. Parameters shall not be set to zero or changed via a LOG SELECT command.

Table 22 — Device Statistics log page

Bit / Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (14h)					
1	Reserved							
2	(MSB)		PAGE LENGTH (n-3)					
3								(LSB)
4	Device statistics log parameters							
n								

See SPC-3 for a description of the PAGE CODE field and PAGE LENGTH field.

The device statistics log parameter format is shown in table 23.

Table 23 — Device statistics log parameter format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)		PARAMETER CODE					
1								(LSB)
2	DU (0)	DS (1)	TSD (0)	ETC (0)	TMC (0)		LBIN (0)	LP (0)
3	PARAMETER LENGTH (n-3)							
4	DEVICE STATISTICS DATA COUNTER							
n								

The PARAMETER CODE field is defined in table 24.

Table 24 — Device statistics parameter codes

Code	Description
0000h	Lifetime media loads
0001h	Lifetime cleaning operations
0002h	Lifetime power on hours
0003h	Lifetime media motion (head) hours
0004h	Lifetime meters of tape processed
0005h – 7FFFh	Reserved
8000h - FFFFh	Vendor-specific

See SPC-3 for descriptions of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. These bits and fields shall be set to the values shown in table 23.

The PARAMETER LENGTH field indicates the number of bytes in the DEVICE STATISTICS DATA COUNTER field that follows.

The DEVICE STATISTICS DATA COUNTER field is the value of the requested data counter.

6.2 Mode Parameters

6.2.1 Mode parameters overview

This subclause defines the descriptors and pages for mode parameters used with ADC device servers.

See SPC-2 for a description of the mode parameter list, including the mode parameter header and mode block descriptor.

The MEDIUM TYPE field in the mode parameter header is reserved for ADC device servers.

The DEVICE-SPECIFIC PARAMETER field in the mode parameter header is reserved for ADC device servers.

The DENSITY CODE field in the mode parameter block descriptor is reserved for ADC device servers.

The ADC device server may require that the DT device primary port(s) be disabled before certain mode parameters are allowed to be changed (see 6.2.2.3).

The mode page codes for ADC device servers are shown in table 25.

Table 25 — Mode page codes

Page Code	Mode Page Name	Reference
00h-01h	Reserved	
02h	Disconnect-Reconnect	SPC-2
03h - 09h	Reserved	
0Ah	Control mode page	SPC-2
0Bh-0Dh	Reserved	
0Eh	ADC Device Server Configuration	6.2.2
0Fh-17h	Reserved	
18h	Protocol Specific LUN	SPC-2
19h	Protocol Specific Port	SPC-2
1Ah - 1Bh	Reserved	
1Ch	Informational Exceptions Control	SPC-2
1Dh-1Fh	Reserved	
20h-3Eh	Vendor-specific	
3Fh	Return all pages (valid only for the MODE SENSE command)	

6.2.2 ADC Device Server Configuration mode page

6.2.2.1 ADC Device Server Configuration mode page overview

The ADC Device Server Configuration mode page (see table 26) is used to specify the appropriate DT device and ADC device server configurations as needed by the automation device. Subpages are used to extend the scope of the mode page.

Table 26 — ADC Device Server Configuration mode page

Bit Byte	7	6	5	4	3	2	1	0
0	PS	SPF (1b)	PAGE CODE (0Eh)					
1	SUBPAGE CODE							
2	(MSB)		PAGE LENGTH (n-3)					
3								(LSB)
4			Mode parameters					
n								

See SPC-2 for a description of the PS bit, SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field. These bits and fields shall be set to the values shown table 26.

The mode subpage codes for ADC device servers are defined in table 27.

Table 27 — Mode subpage codes

Subpage Code	Description	Reference
01h	Target Device subpage	6.2.2.2
02h	DT Device Primary Port subpage	6.2.2.3
03h	Logical Unit subpage	6.2.2.4

Each subpage contains one or more descriptors. The descriptors may be included in any order. On a MODE SENSE command, all descriptors supported by the ADC device server shall be returned. On a MODE SELECT command, all of the supported descriptors shall be included. Any descriptor included shall be included in its entirety.

6.2.2.2 Target Device subpage

The Target Device subpage is variable length and contains SCSI target device name identification descriptors (see SPC-3) of the DT device. The subpage is defined in table 28.

Table 28 — Target Device subpage

Bit Byte	7	6	5	4	3	2	1	0
0	PS	SPF (1b)	PAGE CODE (0Eh)					
1	SUBPAGE CODE (01h)							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
4	Reserved						MTDN	
5	Reserved							
6	Reserved							
7	Reserved							
	Identification descriptor list							
8	Identification descriptor (first)							
	Identification descriptor (last)							
n								

See SPC-2 for a description of the PS bit, SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field. These bits and fields shall be set to the values shown table 28.

The modify target device name (MTDN) field and identification descriptors are used to modify and report modifications to the DT device SCSI target device names (see SPC-3), as defined in table 29.

Table 29 — MTDN field

Value	MODE SENSE command [a]	MODE SELECT command [a]
00b	The MTDN field shall be set to zero for a MODE SENSE command. The identification descriptors shall contain the currently assigned values.	Do not modify the DT device's SCSI target device names. The identification descriptors shall be ignored.
01b	Invalid value for a MODE SENSE command.	Use the logical unit identifier for logical unit 0 as the DT device SCSI target device name. The identification descriptors shall be ignored.
10b	Invalid value for a MODE SENSE command.	Set the DT device's SCSI target device names to the manufacturer's default value. The identification descriptors shall be ignored.
11b	Invalid value for a MODE SENSE command.	Set the DT device's SCSI target device names to the values in the identification descriptors.
[a] See SPC-2		

The identification descriptors are the same as those in the Device Identification VPD page (see SPC-3). Only identification descriptors with the ASSOCIATION field set to 2h shall be used. On MODE SELECT commands, if any identification descriptor contains an ASSOCIATION field set to a value other than 2h, then the ADC device server shall return CHECK CONDITION status, setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN PARAMETER LIST.

6.2.2.3 DT Device Primary Port subpage

6.2.2.3.1 DT Device Primary Port subpage overview

The DT Device Primary Port subpage contains descriptors that allow the DT device's primary ports to be configured, independent of the port type receiving the command (e.g., a Fibre Channel DT device primary port may be configured via the DT device's ADT port).

The DT Device Primary Port subpage is variable length, and consists of a mode subpage header followed by one or more descriptors (see table 30).

Table 30 — DT Device Primary Port subpage

Bit / Byte	7	6	5	4	3	2	1	0
0	PS	SPF (1b)	PAGE CODE (0Eh)					
1	SUBPAGE CODE (02h)							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
4	DT device primary port descriptors							
n								

See SPC-2 for a description of the PS bit, SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field. These bits and fields shall be set to the values shown table 30.

6.2.2.3.2 DT device primary port descriptor format

The DT device primary port descriptor format is shown in table 31.

Table 31 — DT device primary port descriptor format

Bit / Byte	7	6	5	4	3	2	1	0
0	RELATIVE TARGET PORT							
1	PROTOCOL IDENTIFIER							
2	(MSB)			ADDITIONAL DESCRIPTOR LENGTH (n-3)				
3								(LSB)
4				DT device primary port descriptor parameters				
n								

The RELATIVE TARGET PORT field contains a value assigned by the DT device that uniquely identifies the DT device primary port relative to other DT device primary ports in the DT device, independent of DT device primary port type (see SPC-3). Once assigned, the relative target port value for a DT device primary port shall not be changed as long as the DT device primary port remains on the DT device. A value of 00h is reserved.

The PROTOCOL IDENTIFIER field indicates the type of protocol supported by the DT device primary port (see SPC-3).

The ADDITIONAL DESCRIPTOR LENGTH field indicates the number of descriptor bytes that follow.

The DT device primary port descriptor parameters are described in this subclause.

6.2.2.3.3 Fibre Channel descriptor parameter format

Table 32 describes the format of the descriptor parameter for Fibre Channel port types.

Table 32 — Fibre Channel descriptor parameter format

Bit / Byte	7	6	5	4	3	2	1	0
0	P2P	TOPLOCK	RHA	LIV	MPN		Rsvd	PE
1	Reserved				SPDLOCK	SPEED		
2	Reserved							
3	Rsvd	FC-AL LOOP ID						
4								
		PORT NAME						
11								

A DT device receiving a MODE SELECT command for an enabled DT device primary port, where the command attempts to change the value of the MPN, LIV, RHA, TOPLOCK, P2P, SPEED, SPDLOCK, FC-AL LOOP ID, or PORT NAME fields, shall return CHECK CONDITION. The Sense Key shall be ILLEGAL REQUEST, and the additional sense

code shall be INVALID FIELD IN PARAMETER LIST. If the DT device primary port is disabled, the DT device may change the MPN, LIV, RHA, TOPLOCK, P2P, SPEED, SPDLOCK, FC-AL LOOP ID, or PORT NAME fields and enable the DT device primary port with the same MODE SELECT command.

A port enable (PE) bit set to one enables the DT device primary port (see 4.2.8). When the PE bit is set to zero, the DT device shall not enable the DT device primary port's drivers and the DT device primary port shall not respond to primitives (see FC-AL-2).

The modify port name (MPN) and PORT NAME fields are used to modify and report modifications to the DT device primary port's name identifier (see FC-FS), as defined in table 33.

Table 33 — MPN field

Value	MODE SENSE command [a]	MODE SELECT command [a]
00b	The MPN field shall be set to zero for a MODE SENSE command. The PORT NAME field shall contain the currently assigned value.	Do not modify the DT device primary port's name identifier (see FC-FS). The PORT NAME field shall be ignored.
01b	Invalid value for a MODE SENSE command.	Reserved.
10b	Invalid value for a MODE SENSE command.	Set the DT device primary port's name identifier to the manufacturer's default value. The value in the PORT NAME field shall be ignored.
11b	Invalid value for a MODE SENSE command.	Set the DT device primary port's name identifier to the value in the PORT NAME field.
[a] See SPC-2		

The loop ID valid (LIV) and require hard address (RHA) bits are described in table 34.

Table 34 — Effect of LIV and RHA bits

LIV	RHA	Description
0b	0b	The FC-AL LOOP ID field shall be ignored.
0b	1b	This bit value combination is invalid. A MODE SELECT command (see SPC-2) shall be terminated with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST and the additional sense code shall be set to INVALID FIELD IN PARAMETER LIST.
1b	0b	The DT device primary port attempting to operate in an arbitrated loop topology shall use the value in the FC-AL LOOP ID field to request the Hard AL_PA during the LIHA Loop Initialization Sequence (see FC-AL-2) provided it has not already obtained its address. The DT device primary port may obtain its address during any of the Loop Initialization Sequences.
1b	1b	The DT device primary port attempting to operate in an arbitrated loop topology shall use the value in the FC-AL LOOP ID field to obtain its address during the LIHA Loop Initialization Sequence. The DT device primary port shall not obtain an address during the LIFA or LIPA Loop Initialization Sequences if the value of the FC-AL LOOP ID field does not match the previously obtained address. The DT device primary port shall not attempt to obtain an address during the LISA Loop Initialization Sequence. If there is a conflict for the Hard Address (see FC-AL-2) during loop initialization, the DT device primary port shall enter the nonparticipating state. If the DT device primary port detects loop initialization while in the nonparticipating state, the DT device primary port shall again attempt to get the address specified by the value in the FC-AL LOOP ID field.

A topology lock (TOPLOCK) bit set to one forces the DT device primary port to operate only in the mode selected by the P2P bit. A TOPLOCK bit set to zero indicates the DT device primary port may negotiate the topology (see FC-FS). If the TOPLOCK bit is set to zero in a MODE SELECT command (see SPC-2), the P2P bit shall be ignored.

A point-to-point (P2P) bit set to one indicates the DT device primary port is configured to operate in point-to-point mode. If the P2P bit is set to one and the TOPLOCK bit is set to one, the RHA bit, LIV bit, and FC-AL LOOP ID field shall be ignored in a MODE SELECT command. A P2P bit set to zero indicates the DT device primary port is configured to operate in arbitrated loop mode.

The SPEED field indicates the bit rate (see table 35) in which the DT device primary port is configured to operate.

Table 35 — Speed Values

Value	Speed
000b	1 Gb/sec.
001b	2 Gb/sec.
010b	4 Gb/sec.
011b	8 Gb/sec.
100b – 111b	Reserved

A speed lock (SPDLOCK) bit set to one forces the DT device primary port to only operate in the speed selected by the SPEED field. A SPDLOCK bit set to zero allows the DT device primary port to negotiate the speed (see FC-FS). When the SPDLOCK bit is set to zero on a MODE SELECT command, the SPEED field shall be ignored.

The FC-AL LOOP ID field contains the loop identifier that shall be used to represent the hard assigned AL_PA (see FC-AL-2).

The PORT NAME field contains the DT device's primary port name identifier (see FC-FS). When the MPN field is set to 11b, the PORT NAME field contains an NAA identifier type name identifier (see SPC-3)

6.2.2.3.4 Parallel SCSI descriptor parameter format

Table 36 defines the format of the descriptor parameter for parallel SCSI port types.

Table 36 - Parallel SCSI descriptor parameter format

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved			BMQ		BUS MODE		PE
1	Reserved							
2	MINIMUM TRANSFER PERIOD FACTOR							
3	SCSI ADDRESS							

A DT device receiving a MODE SELECT command for an enabled DT device primary port, where the command attempts to change the value of the BUS MODE, BMQ, MINIMUM TRANSFER PERIOD FACTOR, or SCSI ADDRESS fields, shall return CHECK CONDITION. The Sense Key shall be ILLEGAL REQUEST, and the additional sense code shall be INVALID FIELD IN PARAMETER LIST. If the DT device primary port is disabled, the DT device may change the BUS MODE, BMQ, MINIMUM TRANSFER PERIOD FACTOR, or SCSI ADDRESS fields and enable the DT device primary port with the same MODE SELECT command.

A port enable (PE) bit set to one enables the DT device primary port to respond to selections on the SCSI bus (see SPI-5). A PE bit set to zero prevents the DT device primary port from responding to or attempting selections, reselections, or hard resets on the SCSI bus (see 4.2.8).

The BUS MODE field identifies the transmission mode that the DT device shall use in the TRANSCEIVER MODE field of the Negotiated Settings mode subpage (see SPI-5) for this DT device primary port.

The bus mode qualifier (BMQ) field qualifies the effect (see table 37) that the BUS MODE field has on the DT device primary port.

Table 37 — Effect of BMQ field

Value	Effect
00b	The DT device shall ignore the value of the BUS MODE field.
01b	The DT device operates the DT device primary port as specified by the BUS MODE field. The DT device primary port shall not drive the DIFFSENS line with the associated voltage and current characteristics (see SPI-5).
10b	Reserved
11b	The DT device operates the DT device primary port in the mode specified by the BUS MODE field. The DT device primary port shall drive the DIFFSENS line with the associated voltage and current characteristics (see SPI-5).

The MINIMUM TRANSFER PERIOD FACTOR field identifies the minimum transfer period factor that the DT device shall use when negotiating transfer agreements (see SPI-5) for this DT device primary port. DT devices that are not able to support the identified minimum transfer period factor may enter negotiation using the next larger supported transfer period factor.

The SCSI ADDRESS field indicates the address that the DT device primary port shall respond to on the SCSI bus.

6.2.2.4 Logical Unit subpage

6.2.2.4.1 Logical Unit subpage overview

The Logical Unit subpage is variable length, and consists of a mode subpage header followed by one or more descriptors. The descriptors may be included in any order. On a MODE SENSE command, all logical units supported by the DT device (i.e., ADC logical units, RMC logical units, and SMC logical units) other than W-LUNs (see SPC-3) shall have descriptors returned. On a MODE SELECT command, all of the supported descriptors shall be included. Any descriptor included shall be included in its entirety.

Table 38 describes the Logical Unit subpage.

Table 38 — Logical Unit subpage

Bit / Byte	7	6	5	4	3	2	1	0
0	PS	SPF (1b)	PAGE CODE (0Eh)					
1	SUBPAGE CODE (03h)							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
4	Logical unit descriptors							
n								

See SPC-3 for a description of the PS bit, SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field. These bits and fields shall be set to the values shown table 38.

The logical unit descriptors are described in this subclause.

6.2.2.4.2 RMC logical unit descriptor format

The descriptor format for an RMC logical unit (e.g., Device Type = 01h in the case of a stream device) is defined in table 39.

Table 39 — RMC logical unit descriptor format

Bit / Byte	7	6	5	4	3	2	1	0
0	LOGICAL UNIT INDEX							
1	DEVICE TYPE							
2	(MSB)							
3	ADDITIONAL DESCRIPTOR LENGTH (n-3)							(LSB)
4								
5	LOGICAL UNIT NUMBER							
6	MLUD		Reserved				OFFLINE	ENABLE
7	Reserved		AUH	SUHO	AMO	AUTOLOAD MODE		
8	MUE	MUP	Reserved	MANDROFF	CP	DRMODE	Reserved	WP
9	CURRENT DENSITY							
10	Reserved							
11	Reserved							
12	Reserved							
13	Reserved							
14	Reserved							
15	Reserved							
	Identification descriptor list							
16	Identification descriptor (first)							
	Identification descriptor (last)							
n								

The LOGICAL UNIT INDEX field contains a value assigned by the DT device that uniquely identifies the RMC logical unit from all other logical units on the DT device, independent of device server. Once assigned, the logical unit index value for a logical unit shall not be changed.

The DEVICE TYPE field indicates the type of command set supported by the RMC logical unit. The DEVICE TYPE field contains the same value that would be returned by the RMC logical unit in the PERIPHERAL DEVICE TYPE field for an INQUIRY command (see SPC-2).

The ADDITIONAL DESCRIPTOR LENGTH field indicates the number of descriptor bytes that follow.

The LOGICAL UNIT NUMBER field specifies, for the RMC logical unit when accessed through the DT device primary port(s):

a) The LUN if access controls are not in effect; or
b) The default LUN if access controls are in effect (see SPC-3).

The LOGICAL UNIT NUMBER field contains the first two bytes (i.e., bytes 0 and 1) of a single level logical unit structure or the contents of a two byte extended logical unit address (see SAM-2). The LOGICAL UNIT NUMBER field shall be ignored if the ENABLE bit is set to zero. The ADC device server shall return a CHECK CONDITION to a MODE SELECT command when multiple descriptors with the ENABLE bit set to one have the same value in the LOGICAL UNIT NUMBER field. The sense key shall be set to ILLEGAL REQUEST and the additional sense code shall be set to INVALID FIELD IN PARAMETER LIST.

An ENABLE bit set to one indicates that the DT device primary port(s) associated with the RMC logical unit shall be responsive to SCSI tasks received on that DT device primary port(s). An ENABLE bit set to zero indicates that the DT device primary port(s) associated with the RMC logical unit shall not respond to SCSI tasks received on that DT device primary port(s) and the associated RMC logical unit number shall not be reported in any REPORT LUNS command. The ENABLE bit has no effect on the access to the RMC device server through the ADT port.

If the OFFLINE bit is set to one, the RMC device server shall return CHECK CONDITION to all commands that require the RMC logical unit to be in the ready state. The sense key shall be NOT READY. The additional sense code shall be LOGICAL UNIT NOT READY, OFFLINE. If the OFFLINE bit is set to zero, the RMC device server shall respond normally to commands.

The modify logical unit descriptor (MLUD) field (see table 40) modifies and reports modifications to the RMC logical unit's device identifiers.

Table 40 — MLUD field

Value	MODE SENSE command [a]	MODE SELECT command [a]
00b	The MLUD field shall be set to zero for a MODE SENSE command. The identification descriptors shall contain the currently assigned values.	Do not modify the RMC logical unit's device identifiers. The identification descriptors shall be ignored.
01b	Invalid value for a MODE SENSE command.	Reserved.
10b	Invalid value for a MODE SENSE command.	Set the RMC logical unit's device identifiers to the manufacturer's default values. The identification descriptors shall be ignored.
11b	Invalid value for a MODE SENSE command.	Set the RMC logical unit's device identifiers to the values in the identification descriptors.
[a] See SPC-2		

The AUTOLOAD MODE field (see table 41) specifies the action to be taken when a medium is inserted. If the AMO bit is set to zero the AUTOLOAD MODE field shall be ignored.

Table 41 — AUTOLOAD MODE field

Value	Definition
000b	Medium shall be loaded for full access.
001b	Medium shall be loaded for medium auxiliary memory access only.
010b	Medium shall not be loaded.
011b – 111b	Reserved.

An autoload mode override (AMO) bit set to one indicates the load process shall be controlled by the AUTOLOAD MODE field (see table 41), overriding the settings in the Control mode page AUTOLOAD MODE field (see SPC-2). An AMO bit set to zero indicates that the settings in the Control mode page AUTOLOAD MODE field shall be used to control the load process.

A SCSI unload hold override (SUHO) bit set to one indicates the HOLD bit in the SCSI LOAD UNLOAD command (see SSC-2) shall be ignored by the RMC device server and the medium shall not be ejected. A SUHO bit set to zero indicates the HOLD bit in the SCSI LOAD UNLOAD command shall control if the medium is ejected or not, as processed by the RMC device server. The SUHO bit shall not affect unload requests processed by the ADC device server.

An automatic unload hold (AUH) bit set to one disables ejecting the medium when the medium is unloaded due to DT device specific conditions (e.g., cleaning complete, invalid medium type, firmware update complete, unsupported format, or other error conditions detected by the DT device). An AUH bit set to zero shall have no effect on the ejecting of the medium. The AUH bit does not affect the unload operation initiated via the physical user interface of the DT device.

A write protect (WP) bit set to one shall write protect the medium. The WP bit shall be set to zero by the DT device each time a medium is unloaded.

A disaster recovery mode (DRMODE) bit set to one indicates that the DT device shall operate in disaster recovery mode. A DRMODE bit set to zero indicates that the DT device shall not operate disaster recovery mode. The definition of disaster recovery mode is outside the scope of this standard. The ADC device server shall set the DRMODE bit to zero when the MANDROFF bit is set to zero and the DT device exits disaster recovery mode.

A clean protect (CP) bit set to one shall prevent the DT device from performing a cleaning operation upon the loading of a cleaning medium. A CP bit set to zero shall not prevent the DT device from performing a cleaning operation upon the loading of a cleaning medium.

A manual disaster recovery off (MANDROFF) bit set to one indicates that the DT device shall exit disaster recovery mode when an application client sets the DRMODE bit to zero. A MANDROFF bit set to zero indicates that the DT device shall exit disaster recovery mode upon detection of a vendor specific event.

A microcode update protect (MUP) bit set to one shall prevent the DT device from performing a microcode update process upon the loading of a medium containing a microcode image. A MUP bit set to zero shall not prevent the DT device from performing a microcode update process upon the loading of a medium containing a microcode image.

A microcode update enable (MUE) bit set to one allows the DT device to prepare to accept a medium containing a microcode image. A description of this preparation is outside the scope of this standard. The MUE bit shall be set to zero by the DT device after the microcode update process completes or is aborted.

The CURRENT DENSITY field shall be set to the density code indicating the density in which the DT device is currently operating. The CURRENT DENSITY field shall be ignored by the DT device on MODE SELECT commands.

The identification descriptors are the same as those in the Device Identification VPD page (see SPC-2). Only identification descriptors with the ASSOCIATION field set to 0h shall be used. On MODE SELECT commands, if any identification descriptor contains an ASSOCIATION field set to a value other than 0h, then the ADC device server shall return CHECK CONDITION status, setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN PARAMETER LIST.

6.2.2.4.3 SMC logical unit descriptor format

The descriptor format for an SMC logical unit is defined in table 42.

Table 42 — SMC logical unit descriptor format

Bit / Byte	7	6	5	4	3	2	1	0
0	LOGICAL UNIT INDEX							
1	DEVICE TYPE (08h)							
2	(MSB)							
3	ADDITIONAL DESCRIPTOR LENGTH (04h)							(LSB)
4								
5	LOGICAL UNIT NUMBER							
6	Reserved						CACHE	ENABLE
7	Reserved							

The LOGICAL UNIT INDEX field contains a value assigned by the DT device that uniquely identifies the SMC logical unit from all other logical units on the DT device, independent of device server. Once assigned, the logical unit index value for a logical unit shall not be changed.

The DEVICE TYPE field shall contain the value shown in table 42 (i.e., peripheral device type = 08h (see SPC-3)).

The ADDITIONAL DESCRIPTOR LENGTH field indicates the number of descriptor bytes that follow and shall be set to the value shown in table 42.

The LOGICAL UNIT NUMBER field specifies, for the SMC logical unit when accessed through the DT device primary port(s):

a) The LUN if access controls are not in effect; or
b) The default LUN if access controls are in effect (see SPC-3).

The LOGICAL UNIT NUMBER field contains the first two bytes (i.e., bytes 0 and 1) of a single level logical unit structure or the contents of a two byte extended logical unit address (see SAM-2). The LOGICAL UNIT NUMBER field shall be ignored if the ENABLE bit is set to zero. The ADC device server shall return a CHECK CONDITION to a MODE SELECT command when multiple descriptors with the ENABLE bit set to one have the same value in the LOGICAL UNIT NUMBER field. The sense key shall be set to ILLEGAL REQUEST and the additional sense code shall be set to INVALID FIELD IN PARAMETER LIST.

An ENABLE bit set to one indicates that the DT device primary port(s) associated with the SMC logical unit shall be responsive to SCSI tasks received on that DT device primary port(s). Received SCSI tasks may be processed by

the local SMC device server or may be passed by the bridging manager to the remote SMC device server for processing (see 4.2.3). An ENABLE bit set to zero indicates that the DT device primary port(s) associated with the SMC logical unit shall not respond to SCSI tasks received on that DT device primary port(s) and the associated SMC logical unit number shall not be reported in any REPORT LUNS command. The ENABLE bit has no effect on the access to the SMC device server through the ADT port.

If the ENABLE bit is changed from one to zero, the local SMC device server shall implicitly abort all commands in its task set and shall report a status of CHECK CONDITION with a sense key of COMMAND ABORTED and an additional sense code of LOGICAL UNIT COMMUNICATION FAILURE for each command. All remaining device servers in the DT device shall report a change in the logical unit inventory (see SPC-2) to any application clients connected through a DT device primary port.

If the ADC device server receives a MODE SELECT command via a DT device primary port, and the parameter data would change the ENABLE bit, then the ADC device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN PARAMETER LIST.

A CACHE bit set to one and the ENABLE bit set to one indicates that the local SMC device server shall cache SMC data and status (see 4.2.3.5). If the ADC device server receives a MODE SELECT command with parameter data of the ENABLE bit set to zero and the CACHE bit set to one, then the ADC device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN PARAMETER LIST. A CACHE bit set to zero indicates that the local SMC device server shall not cache SMC data and status.

6.2.2.4.4 ADC logical unit descriptor format

The descriptor format for an ADC logical unit is defined in table 43.

Table 43 — ADC logical unit descriptor format

Bit / Byte	7	6	5	4	3	2	1	0
0	LOGICAL UNIT INDEX							
1	DEVICE TYPE (12h)							
2	(MSB)			ADDITIONAL DESCRIPTOR LENGTH (04h)				
3								(LSB)
4				LOGICAL UNIT NUMBER				
5								
6	Reserved							ENABLE
7	Reserved							

The LOGICAL UNIT INDEX field contains a value assigned by the DT device that uniquely identifies the ADC logical unit from all other logical units on the DT device, independent of device server. Once assigned, the logical unit index value for a logical unit shall not be changed.

The DEVICE TYPE field shall contain the value shown in table 43 (i.e., peripheral device type = 12h (see SPC-3)).

The ADDITIONAL DESCRIPTOR LENGTH field indicates the number of descriptor bytes that follow and shall be set to the value shown in table 43.

The LOGICAL UNIT NUMBER field specifies, for the ADC logical unit when accessed through the DT device primary port(s):

a) The LUN if access controls are not in effect; or
b) The default LUN if access controls are in effect (see SPC-3).

The LOGICAL UNIT NUMBER field contains the first two bytes (i.e., bytes 0 and 1) of a single level logical unit structure or the contents of a two byte extended logical unit address (see SAM-2). The LOGICAL UNIT NUMBER field shall be ignored if the ENABLE bit is set to zero. The ADC device server shall return a CHECK CONDITION to a MODE SELECT command when multiple descriptors with the ENABLE bit set to one have the same value in the LOGICAL UNIT NUMBER field. The sense key shall be set to ILLEGAL REQUEST and the additional sense code shall be set to INVALID FIELD IN PARAMETER LIST.

An ENABLE bit set to one indicates that the DT device primary port(s) associated with the ADC logical unit shall be responsive to SCSI tasks received on that DT device primary port(s). An ENABLE bit set to zero indicates that the DT device primary port(s) associated with the ADC logical unit shall not respond to SCSI tasks received on that DT device primary port(s) and the associated ADC logical unit number shall not be reported in any REPORT LUNS command. The ENABLE bit has no effect on the access to the ADC device server through the ADT port.

6.3 Vital product data parameters

No unique vital product data (VPD) parameters are defined for ADC device servers.